DOCUMENT RESUME

ED 135 935 CE 008 147

TITLE Modules in Agricultural Education for Agricultural Resources.
INSTITUTION New York State Education Dept., Albany. Bureau of Occupational and Career Curriculum Development.
PUB DATE Jun 74
NOTE 381p.; For related documents see CE 007 550, CE 008 147-148, CE 008 151, CE 009 326-328, ED 105 080 (Modular Design Approach for Agricultural Education), and ED 105 296 (Module Directory for Agricultural Education) ; Not available in hard copy due to print quality of original

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS *Agricultural Education; Conservation (Environment); Forestry; Instructional Materials; Learning Modules; *Natural Resources; Off Farm Agricultural Occupations; Recreation; Skill Development; *Vocational Agriculture

ABSTRACT

Each of the 31 curriculum modules in this packet for agricultural resources instruction contains a brief description of the module content, a list of the major division or units, the overall objective, objectives by units, content outline and suggested teaching methods, student application activities, and evaluation procedures. A list of resource materials is also included in each module. Titles are Maintenance and Management of Forest Plantations; Management of Timber Stands; Campground Development and Management; Summer Recreational Areas--Operation and Maintenance; Winter Recreation Site Operation and Maintenance; Soil Science; Soil and Water Management; Erosion Control; Land Measurement; Advanced Surveying; Bulldozer Service and Operation; Operation of Backhoe and Loader; Construction and Maintenance of Access Roads; Operation of Sanitary Landfills; Conservation Law; Farm and Forest Game Management; Wetland Game Management; Wildlife Disease and Pest Control; Stream Management; Water and Sewage Systems; Collection of Water Samples; Analysis of Water and Wastewater Samples (I); Analysis of Water and Wastewater Samples (II); Sewage Treatment Plant Operation (I); Water Treatment Plant Operation; Atmospheric Sampling of Stacks; Fish Management; Leveling; Conservation Structures (Masonry); Conservation Structures (Carpentry); and Service and Repair of Conservation Equipment. (HD)

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ED135935

MODULES IN AGRICULTURAL EDUCATION

FOR

agricultural resources

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The University of the State of New York
THE STATE EDUCATION DEPARTMENT
Bureau of Occupational and Career Curriculum
Albany, New York 12234

CE 008 147

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MODULE OF INSTRUCTION

Title - MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS Code - 01.0601-01

DESCRIPTION:

This module will cover all the aspects of forest plantation maintenance and management. This will include the identification of the important plantation species, the establishment of the plantation, forest stand improvement, protection of the plantation, and forest inventory. Emphasis will be placed upon the practical experience in site classification, weeding, thinning and pruning. Student will know how and why a forest inventory is done. The greatest part of this module will be carried out in the field.

For more complete knowledge of the planting and protection procedures of forest plantations consult the modules entitled "Christmas Tree Production" and "Forest Fire Control".

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	 Other
1. Identification of important plantation tree species in New York State		4
2. Establishing a plantation		6
3. Forest stand improvement methods		12
4. Protection of the plantation		4
5. Inventorying the forest plantation	2	2
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS

Code - 01.0601-01

OBJECTIVES to be obtained:

The student will be able to:

1. Explain, to the instructor's satisfaction, five means by which trees are identified.
2. Identify by common name twelve important plantation tree species.
3. Identify the silvic (growth patterns and environment needed) considerations for each of twelve tree species identified.
4. Identify five examples of use values of each tree species identified.
5. Recite at least five benefits of plantation establishment to land, wildlife, human and economic requirements.
6. Inspect a proposed planting site and correctly record soil features (structure, texture, type, drainage) and slope, and relate the silvic considerations of a tree species to the site characteristics.
7. Prescribe, to the teacher's standards, the proper tree species for planting on a given site based upon correct analysis of site conditions and use goals.
8. Write and map, to the teacher's standards, a workable planting plan for a given site considering: site classification, choice of tree species re: intended use and site conditions, nursery sources, site preparation, spacing, stocking rates, timing of planting, methods of planting and equipment used.
9. Recite three reasons for the benefits of the various forms of forest stand improvement.
10. Demonstrate, to the instructor's standards, safe and effective use of concepts and equipment in the actual weeding of a forest plantation.

MODULE OF INSTRUCTION

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OBJECTIVES to be obtained:

11. Prescribe, for a given plantation of any age: 1) timing, method, intensity of next thinning (including designation of trees to be left).

12. Demonstrate safe and effective use of all equipment and methods designed for thinning in a plantation. (The student must demonstrate ability to fell, limb, and buck with power and hand saws, axe, wedge, pole, peavey, cable and chain systems.)

13. Prescribe, for a given plantation of any age, timing, method, and intensity of next pruning (including designation of trees to be pruned).

14. Demonstrate ability to prune, with hand and pole saws, to correct height, (depending on age and stage of stand) on correct trees, leaving scar flush to bole of tree. (Standards of evaluation may be set at approximately 8 trees/hr for a 17' prune, or 12 trees/hr for a 7' prune.)

15. Recite, in general terms (to the instructor's standards), the major causes of damage in plantations, and the steps to take in prevention and protection.

16. Prepare a written report with maps, based on the inventory of a specific area of a forest plantation, including the following data:

    a. map of plot boundary, physical features, roads, etc.

    b. summary of cruise plan approved by instructor

    c. field notes of cruise including sampling data re: species composition, tree height, diameter, age, and form factor

    d. computations reducing field data

    e. accurate (to instructor's standards) computations deriving tables showing stand growth and mortality, and stand and stock tables.

    f. forecast re: recommended cutting budget
    " rotation
    " forest stand improvements
    " protection measures
    " use activities

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Title - MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS

OBJECTIVES BY UNIT	CONTENT
Unit # 1. - Identification of important plantation tree species in New York State Objective #1. Explain, to the instructor's satisfaction, five means by which trees are identified.	A. Parts of the tree Leaves Branches Bole Roots Outer Bark Inner Bark Cambium Sapwood Heartwood B. Factors of classification . Leaves •kind •arrangement •form •margin •lobes •shape •base •apex . Twig and Bud •arrangement •size •pith •buds •bud scales . Flowers . Fruit . Bark . Breaching form
Objective #2. Identify by common name twelve important plantation tree species.	C. Identification of 16 (or less) important plantation tree species

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MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture Field Demonstration with handout on tree structure. Cutdown a tree and dissect to show different parts. Describe function of each part Classroom lecture with overhead projector, (use actual leaf and twig specimens on projector) (With transparencies show flower, bud, bark branching form) With blackboard (diagram all factors of classification not handled on overhead). With Handouts (Sketches of different characteristics for student to label).	Class to observe trees under forest conditions. Student to see, touch, smell and/or taste each part of tree. Student to label handout as instructor goes through each part. Classroom with handout to fill in as each characteristic is discussed. Class to observe characteristics in field.	The student will identify and give functions for each part of tree. The student will identify all major characteristics in identifying tree species. Quiz to be given at completion of objectives 1 and 2.
Field lecture Each tree identified in field and its identifying characteristics noted. Begin with the easiest conifers, then move to the broadleaf species reinforcing leaving with intermittent informal quizzing of students on trees identified.	As many trees as possible will be shown under field conditions. For any trees not readily reached specimens will be brought into classroom. Recommend the following as important plantation species. Pines Spruces Other White White Douglas fir Red Norway Balsam fir Scotch larch Austrian White cedar Jack Broad Leaf Butternut Blk. Walnut Sugar Maple Yellow poplar Blk. locust	Student will be able to identify all species of trees presented by instructor. Oral quiz.

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OBJECTIVES BY UNIT	CONTENT
Unit #1 - Objective #3. Identify the silvic (growth patterns and environment needed) considerations for each of twelve tree species identified.	D. Silvic considerations of trees Identified . growth . form . site requirements . associate species . tolerance . range . seed production
Objective #4. Identify five examples of use values of each tree species identified.	E. Commercial and other values of plantation tree species. Major values . recreation . wildlife . watershed . environmental quality . veneer . syrup . Christmas trees . pulp . poles . lumber Minor values . nuts and fruit . oils and extracts . decorations . naval stores . drugs . log construction . chips . millwaste . fuel wood . excelsior . charcoal . fiber products . chemical " . distillation " . piles . posts . ties

MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture Students have second chance to identify and observe tree species.	Field: . Students identify tree using information from previous day. . Instructor lectures and points out examples of the silvic considerations re: the particular tree species. . Move on to next tree and repeat steps 1 & 2. . Frequently stop and ask questions reviewing past lecture of the day. . Quiz students re: name of tree only. When test slips are all returned, identify the tree and cover its silvic considerations.	Quiz
Recommend field trip to observe production and use of such products. Class lecture 1, 2) T.R. 14:5) Field trip to one or more of the following places: Lumber mill Charcoal mfg. Park State Reforestation area Paper Mill	Field trip to observe production and use of such products and/or lecture and show pictures of production and use.	Have each student give at least 5 examples of how trees can be used.

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OBJECTIVES BY UNIT	CONTENT
Unit # 2. - Establishing a plantation. **Objective #5.** **Recite at least five benefits of plantation establishment to land, wildlife, human and economic requirements..**	**A. Purposes of Planting** Land stabilization Watershed Protection Wildlife Habitat Environmental quality Economic
Objective #6. **Inspect a proposed planting site and correctly record soil features (structure, texture, type, drainage and slope, and relate the silvic considerations of a tree species to the site characteristics.**	B. **Planting Site Classification** . Soil features texture color and mottling tilth PH slope past treatment . Physical features drainage soil depth available moisture fertility planting difficulty access & trafficability hazards to survival & early growth
Objective #7. **Prescribe, to the teacher's standards, the proper tree species for planting on a given site based upon correct analysis of site conditions and use goals.**	**C. Choice of tree species** . Intended use . Site conditions

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture Pick an area where several benefits are evident.	Notes taken on 5 benefits.	Have each student recite 5 different benefits in establishing a plantation.
Field lecture Field demonstration - soil profile to show texture, mottling, and tilth. - Show how to determine slopes (8)	Dig soil pits and have students classify a planting site using "site judging card" in Reference (8)	Check each student's site judging card to determine his understanding at each pit.
Field lecture at site of established plantations and at other potential sites 3: Ch.6, PP17-20 9L 6-7 10: 4-7, 23-33 11 14: 6-7 15: 19-22 17: 19: 238-244	Students are to select trees for three different sites.	Check student choices of trees for three sites chosen by instructor.

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OBJECTIVES BY UNIT	CONTENT
Unit 2. - Objective # 8. Write and map, to the teacher's standards, a workable planting plan for a given site considering: site classification, choice of tree species re intended use and site conditions, nursery sources, site preparation, spacing, stocking rates, timing of planting, methods of planting and equipment used.	D. Obtaining and handling seedlings (covered in module "Christmas Tree Production") E. Planting methods (covered in module "Christmas Tree Production") F. Planning & Preparation . Spacing . Stocking rates . Mixed & pure stands . Seasons for planting . Site preparation
Unit 3. - Forest stand improvement methods Objective #9. Recite three reasons for the benefits of the various forms of forest stand improvement.	A. Purpose Quality Quantity
Objective #10. Demonstrate, to the instructor's standards, safe and effective use of concepts and equipment in the actual weeding of a forest plantation.	B. Weeding Mechanical Chemical

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MAINTENANCE AND MANAGEMENT OF FOREST PLANTATIONS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
9:13-19) 10:13-21)Field lec- 14:14-15,18-24) ture - T.R. 15:9-15) work exper- 16:) ience - Lab 18:) report 19:262-283,311-350)	Students prepare and submit for evaluation according to instructor's standards a report including: · Classification of specific planting site . Selection of planting species re: site conditions and use goals. . Prescribed spacing, stocking rates, species composition, timing of planting, and site preparation.	Evaluate the student report for accuracy and thoroughness.
Lecture in field (2) T.R. and handouts - and - Lecture in classroom with visuals	Students observe plantations that exhibit results of both use and non-use of proper weeding, pruning and thinning practices. Dissect (or use increment borer) trees to show effect of thinning and pruning on growth rate and quality of lumber.	Have students list three different reasons for weeding, thinning and pruning.
Field demonstration (24: 3-4) T.R. Work Experience - Identify with students planting sites in need of and not in need of weeding. USE ONLY THOSE CHEMICALS ALLOWED BY LAW. (NEW YORK STATE)	Provide work experience in mechanical and chemical weeding using axes, machetes, chemical weed killers. Distinguish between desirable and undesirable tree species that may invade a plantation.	Check students on proper mixing of chemical and proper procedure in weeding.

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OBJECTIVES BY UNIT	CONTENT
Unit 3. (continued) Objective #11. Prescribe, for a given plantation of any age: 1) timing method, intensity of next thinning (including designation of trees to be left).	C . Thinning . Methods of selection selection system row thinning
Objective #12. Demonstrate safe and effective use of all equipment and methods designed for thinning in a plantation. (The student must demonstrate ability to fell, limb, and buck with power and hand saws, axe, wedge, pole, peavey, cable and chain systems).	. Pre-commercial and subsequent thinnings release cuttings improvement cuttings use of chemicals
Objective #13. Prescribe, for a given plantation of any age, timing, method, and intensity of next pruning (including designation of trees to be pruned).	D. Pruning . Purpose (improve quality) . Season . Standage . Equipment use maintenance safety . Pruning correctly effective technique selection of trees to prune
Objective #14. Demonstrate ability to prune, with hand and pole saws, to correct height (depending on age and stage of stand) on correct trees, leaving scar flush to bole of tree. (Standards of evaluation may be set at approximately 8 trees/hr for a 17' prune, or 12 trees/hr for a 7' prune.)	

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
(19: 29-127) (20), (22: 5-8) Field demonstration (23: 16-21) Work Experience (24: 4-10)	Students identify plantations in need of thinning, and stands that have been properly thinned.	Student should have ability to select method of thinning and should demonstrate safe and efficient means of actual thinning.
(19: 156-202) (19: 203-234) (19: 174-185) 23:20), (24, 3-4) (25), (26)	Work Experience in determining timing and method of thinning, selection of "leave trees" and in removing trees from the stand. Recommend that a plantation be obtained and subdivided for practicing different thinning methods. Stress safety.	Instructor observation.
Field demonstration Work Experience (19: 128-155) (21), (22, 8-9) (T. R.) (24: 11-15)	. Instructor identifies plantations in need of and not in need of pruning. . Instructor demonstrates selection of trees to be pruned. . Instructor demonstrates safe and effective pruning with equipment stressing correct scar to leave on tree bole. . Instructor demonstrates proper maintenance of pruning equipment. . Students select and prune trees.	Students should have ability to select trees for pruning and should demonstrate safe, efficient and correct means of pruning. Student should prune at a rate of 8 trees /hour at 17' prune and 12 trees/hour at 7 feet prune

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OBJECTIVES BY UNIT	CONTENT
Unit 4. Protection of the plantation. Objective 15. Recite, in general terms (to the instructor's standards), the major causes of damage in plantations, and the steps to take in prevention and protection.	(Scope of unit: individual module of instruction covering fire protection. The purpose of this unit on protection is to relate the instruction in the other module to the problems of forest plantation mgt., and to introduce some areas of protection not covered in the other module.) A. Introduction . Need for protection . Kinds of damaging agents fire animal insect wind disease ice trespass B. Fire Control . Effects of fire in the plantation . Defense against fire through mgn't. practices • sanitation • firebrakes C. Insects . Recognition of damage . Types of damage . Control silvicultural chemical D. Disease . Recognition of damage . Types of damage . Control silvicultural chemical

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture (29: 1-6) during (3: ch7) (29:7) (22:19-22) (23:12-13) field (31) (3:Ch8) (22:27-30) (23:14) (29:51-125) (30) trip (3:Ch.8) (22:22-27) (23:14) (28) (29:14-25)	Field trip to forest plantations exhibiting damage and/or protective measures to prevent damage by fire, insects, disease, trespass, animals, and/or climatic factors.	Quiz to demonstrate student understanding of general causes of damage and prevention of damage to tree plantations.

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OBJECTIVES BY UNIT	CONTENT
Unit 5.- Inventorying the forest plantation Objective #16. Prepare a written report with maps, based on the inventory of a specfic area of a forest plantation, including the following data: . A map of plot boundary, physical features, roads, etc. . Summary of cruise plan approved by instructor. . Field notes of cruise including sampling data re: species composition, tree height, diameter, age, and form factor. . Computations reducing field data. . Accurate (to instructor's standards) computations deriving tables showing stand growth and mortality and stand and stock tables. . Forecast re: recommended cutting budget - recommended rotation recommended forest stand improvements recommended protection measures recommended use activities	A. Purpose (to know where you are and where you are going) B. Forest mapping . Aerial photo (see module Mgt. of timber stands) . Transit survey C. Timber cruising . Sampling methods . Use of equipment prism abney biltmore stick note form increment borer tape diameter tape compass pace tree calipers climbing gear D. Records . Growth and mortality . Stand and stock tables . Cutting budget . Determining the rotation

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EDUCATION

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TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture Field demonstration (23:6) (T.R.) Work Experience Student reports	. Assign 1 acre plots of plantation to crews . Each crew do a boundary survey of its plot and hand in a map describing boundary, physical features, roads, etc.	Student crews to pass in completed report. Evaluate on completeness and accuracy.
(3:chl) Classroom lecture (22:39-42) (23:7-11)	Student crews to submit a cruise plan for their assigned plots to the instructor for approval.	
	Student crews to cruise their 1 acre plots re: species composition, height and diameter, age, form factor.	
(same three Field demonstration references) Work Experience	Student crews to work field data into a form representing true stand condition.	
	Student crews to complete reduction of field cruise notes.	
(3: Chl, pa 90-98) (ibid, pa 88-90) (ibid: Ch3) (32: Ch.11)	Student crews to prepare accurate data on stand, growth and mortality, draw up stand and stock tables, specify and recommend cutting budget and rotation.	
	Final crew reports to be handed in to instructor for evaluation. Reports to include description and results of all activities in the unit.	

RESOURCE MATERIALS

A. Books -

2. Harlow, Wm. M., & Elwood S. Harrar. Textbook of Dendrology. McGraw-Hill Book Co., Inc.: New York. 1958. 561pp. : Has.

3. Society of American Foresters. Forestry Handbook. Edited by R. D. Forbes. The Ronald Press Co. : New York. 1961. illus. ($15, Ben Meadows Co.)

17. Forest Service, U. S. Department of Ag. Silvics of Forest Trees of the United States. Div. of Timber Management Research, compiled and revised by H.A. Fowells. 762pp. illus. 1965. (superintendent of Documents, U.S. Gov. Printing Office, Washington, D.C., 20402, $4.25)

19. Smith, David M. The Practice of Silviculture. John Wiley & Sons, Inc:N.Y. 1962. 7th edition. 578pp. illus.

29. Krygier, James T. "Handbook of Forest Protection." Oregon State University Cooperative Assoc.: Corvallis, Oregon. 1961. 127pp. illus.

32. Davis, Kenneth P. American Forest Management. McGraw-Hill Book Co., Inc.: New York. 1954. 482pp. illus.

Anderson, David A. and Smith, William A. Forests and Forestry. Interstate Printers Inc., Danville, Illinois, 1970, 357 pp.

B. Bulletins -

1. Cope, J.A., & F.E. Winch. "Know Your Trees." New York State College of Agriculture Cornell 4-H Bulletin 85. 72pp. illus.
8. Stone, Earl L., Reeshon Feuer, & Hugh M. Wilson. "Judging Land For Forest Plantation in N. Y." NYS College of Ag. Cornell Ext. Bull. 1075. 16pp. illus. January, 1962.
9. Winch, Fred E. "Future Forests." NYS Col. of Ag. Cornell 4-H Bull. 90. 28pp. illus. 1967.
10. Guise, C. H. "Forest Planting on the Farm." Cornell Ext. Bull. 226. 38pp. illus.1946
11. Stone, E. L. "A Check List for Planting Site Appraisal." NYS Coll. of Ag., Cornell Univ. Conservation Circular Vol. 6, No. 4. Oct. 1968.
14. Morrow, Robert R., Lawrence S. Hamilton, & Fred E. Winch, Jr. "Planting Forest Trees on N. Y. Farms." Cornell Ext. Bull. 956. NYS Coll. of Ag. 31pp. illus. 1959.
15. NYS Conservation Dept. "Forest Planting in NY." Forestry Bull. 2. 22pp.illus. 1957.
16. ibid "Tree Planting." Forest Mgt. Leaflet No. 1. 1967. (Div.of Lands and Forests)
20. ibid "Forest Stand Improvement." 1959. (Div. of Lands & Forests)
21. ibid "Prune for Quality." 1959. (Div. of Lands & Forests)
22. U.S.Dept. of Ag. "Managing the Small Forest." Farmers Bull. No. 1989. 61pp. illus.
23. Dickson, Alex. "Mgt. of Small Woodlots In N.Y." NYS Coll. of Ag. Cornell Ext.Bull. 1125. May 1964. 32pp. illus.
24. Winch, Fred E., Jr. "Care of Forest Plantations on Farm Lands." New York State Coll. of Ag., Cornell Ext. Bull. 867. 1967. 15pp. illus.
25. Morrow, Robert R., and Lawrence S. Hamilton. "Killing Undesirable Vegetation With Chemicals." New York State College of Ag., Cornell Ext. Bull. 1147. 1965. 12pp. illus.
26. New York State Conservation Dept. Div. of Lands & Forests. "Use of Chemi-Killers in Forest Management." Forest Management Leaflet No. 3. 1959.
28. Hepting, Geo. H., and Marvin E. Fowler. "Tree Diseases of Eastern Forest and Farm

U. S. Department of Agriculture "Planting Black Walnut for Timber" - leaflet No. 487, 6 pp.

RESOURCE MATERIALS

A. Books -

B. Bulletins - (continued)

Woodlots." U. S. Dept. of Ag. - Forest Service. Agricultural Information Bull. No. 254. 1969. 48pp. illus.

30. State University College of Forestry at Syracuse, New York. Group of bulletins available on forest insect pests.

31. Countryman, Clive M. "Mass Fires and Fire Behavior." U.S.Dept. of Ag.-Forest Service. Research Paper PSW - 19. 1964. 53pp. illus.

RESOURCE MATERIALS (cont'd)

C. Periodicals -

18. Cook, David B. "Spacing & Layout for Coniferous Plantations in the Northeast." Journal of Forestry. Vol. 61, No. 4., April 1963. pg. 273-277.

D. Audiovisuals -

Filmstrips - NASCO Agricultural Science Catalog
Identification of Trees $18.00
Identifying Coniferous Trees $4.55
Protecting Forests from Insects and Diseases $6.00
Slides -- NASCO Agricultural Science Catalog
Native Trees of Northern United States 83 slides $37.95

LEAF CHARACTERISTICS

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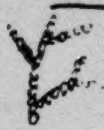

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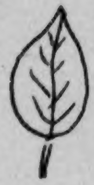

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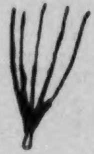

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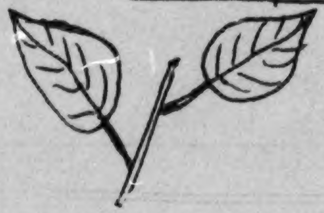

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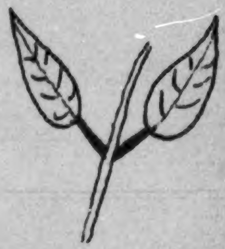

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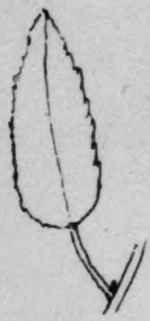

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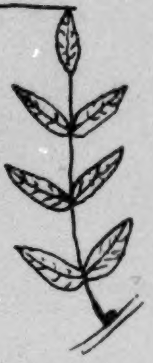

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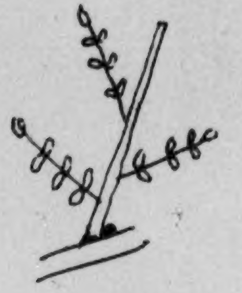

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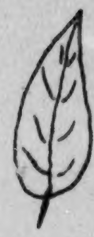

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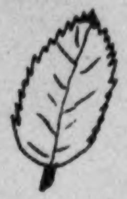

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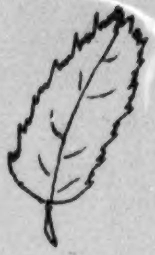

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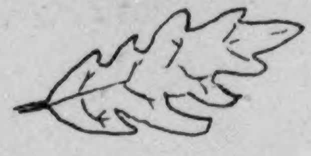

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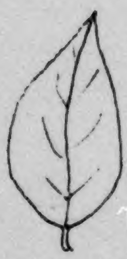

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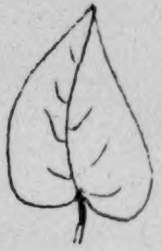

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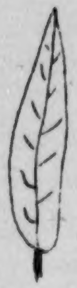

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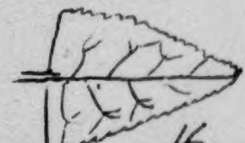

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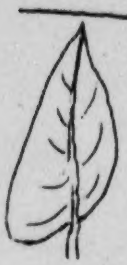

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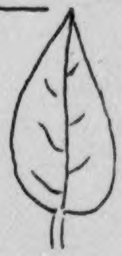

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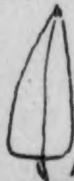

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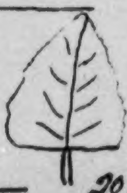

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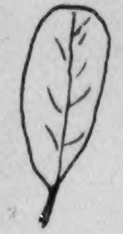
APEX



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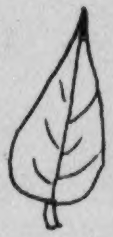

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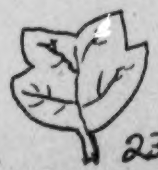

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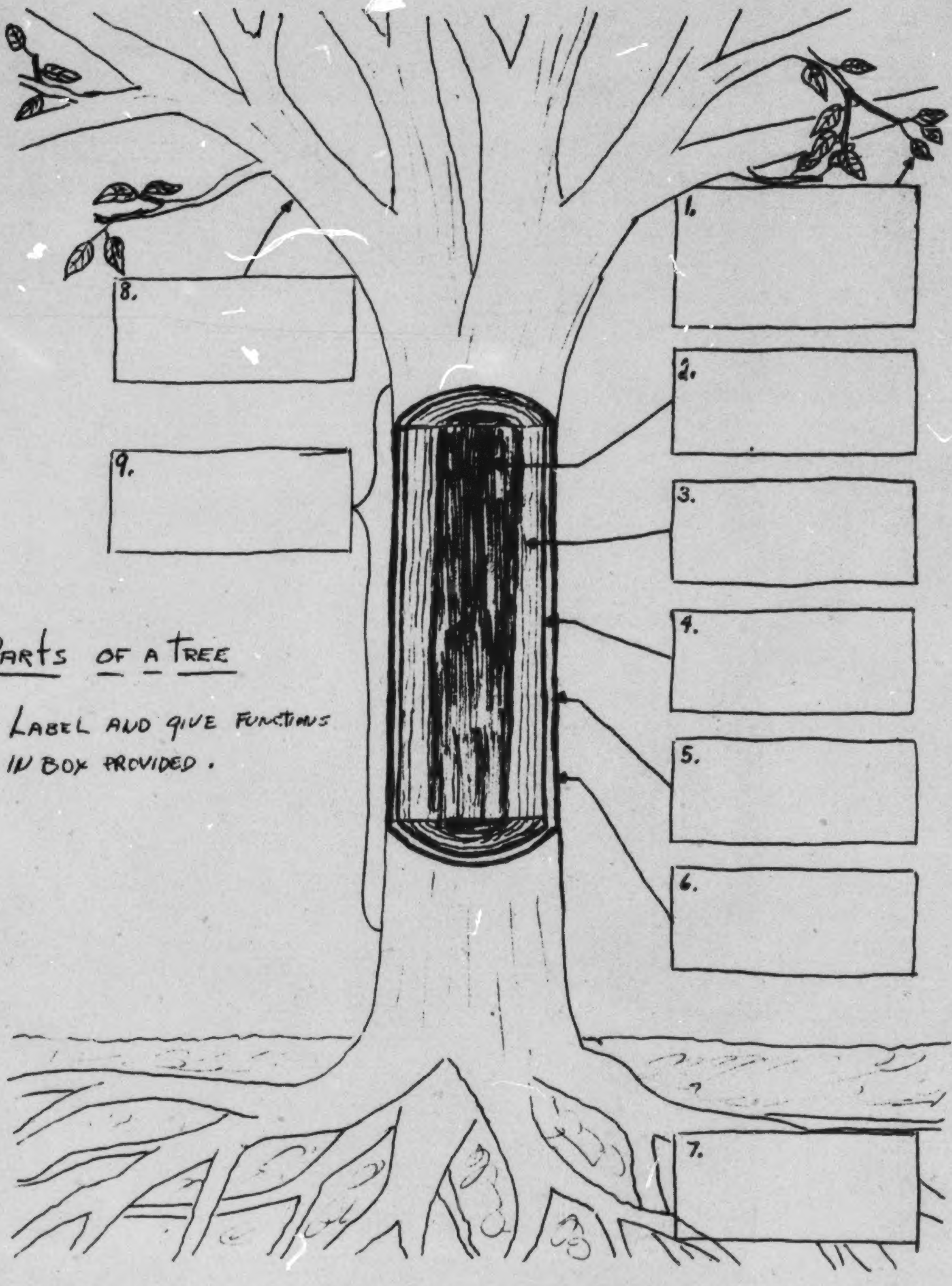

Parts of a Tree

LABEL AND GIVE FUNCTIONS IN BOX PROVIDED.

MODULE OF INSTRUCTION

Title - MANAGEMENT OF TIMBER STANDS Code - 01.0601-02

DESCRIPTION:

This module deals with the management of naturally established woodlands for the harvest of wood products. The students will practice various cultural treatments to the stand (silvicultural) and various harvesting methods designed to permit different patterns of natural regeneration of the site by preferred tree species.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Purposes and scope	1	1
2. Natural and economic considerations		4
3. Silvicultural treatments	1	11
4. Harvesting and regeneration methods	1	11
	3	27

Revised June, 1974

MODULE OF INSTRUCTION

Title - MANAGEMENT OF TIMBER STANDS Code - 01.0601-02

OBJECTIVES to be obtained:

The student will:

1. Identify the reasons for timber stand management
2. By means of a written quiz outline demonstrate a basic knowledge of the basic skills and concepts pertaining to timber stand management
3. Categorize a given timber stand as to its site and stand conditions
4. Forecast probable future stand conditions with no management techniques applied
5. Designate in the field trees categorized as "weed" species and trees categorized as "production" species
6. Recite the effects of management upon the quality and quantity of wood in a timber stand
7. Recite ________ ways to upgrade wood quality and quantity of a stand
   number
   through intermediate cuttings
8. Recite the obj~~ective and~~ justification for intermediate cuttings in a timber stand
9. Recite the meanings of economic and biological maturity in a timber stand managed for a financial goal
10. Write one plan each for a liberation cut, cleaning, and weeding operation
    . Adequate control over timing and extent of such release cuts
    . Methods and tools to be used
    . Specification of manpower deployment
11. Demonstrate ability to implement a prescribed release cutting successfully and safely to instructor's standards of efficiency and effectiveness by marking trees in a stand that are to be removed
12. Demonstrate in the field ability to designate trees that are of poor species, poor form, over mature, or in danger of mortality due to factors other than from crowding
13. Write one plan each for an improvement cutting and a salvage cutting to include timing and extent of each operation, as well as the general plan of operation
14. Demonstrate ability to implement an improvement cutting plan *or* a salvage cutting plan by marking trees for removal
15. Designate under field conditions trees within a stand that should be pruned and timber stands that are in need of pruning
16. Recite ________ objectives of artificial pruning
    number
17. Write a plan of operation for a pruning exercise on a specific timber stand site including timing, extent, equipment, manpower, and specifications of tree types to be pruned
18. Demonstrate ability to implement a pruning plan by marking trees to be pruned
19. Recite ________ natural factors affecting the regeneration of a timber
    number
    stand (including site, climate, animal, insect, and disease)

MODULE OF INSTRUCTION

Title - MANAGEMENT OF TIMBER STANDS Code - 01.0601-02

OBJECTIVES to be obtained:

20. Recite ________ ways artificial regeneration may be carried out
    number
21. Demonstrate, in the field, the ability to prescribe for satisfactory regeneration in a timber stand under management
22. Recite for each harvesting system covered in class:
    - Special pattern of cutting
    - Rate of removal
    - Management practices followed
23. Write a harvest plan for a given timber stand of ________ acres using
    number
    one of the harvesting systems covered in class, or a variation of a harvesting system
24. Demonstrate ability to implement such a plan by marking the trees in the stand to be cut

Code - 01.0601-02

Title - MANAGEMENT OF TIMBER STANDS

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Purpose and Scope of Timber Stand Management Objective #1 Identify the reasons for timber stand management. Objective #2 By means of a written quiz demonstrate a basic knowledge of the basic skills and concepts pertaining to timber stand management	A. Purpose of timber stand regeneration (Basically expand upon the idea of applying cultural treatments to a forest to increase its productivity in both quantity and quality of raw materials in as short a time span possible). (Management to maintain a continuous adequate supply of high quality wood over the long run - sustained yield) B. Scope of timber stand regeneration (Expand upon the union of biological and economic considerations in maintaining a profitable timber management enterprise). Discuss the several disciplines important to successful timber management enterprise. . Accounting . Marketing . Law . Labor Relations . Real Estate . Taxation . Surveying . Road Construction . Insurance . Silvics & Silviculture . Mensuration . Harvesting . Protection . Wild Life . Recreation . Water . Etc.

Unit 2 - Natural and Economic Considerations of Timber Stand Management
Objective #3
Categorize a given timber stand as to its site and stand conditions
Objective #4
Forecast probable future stand conditions with no management techniques applied
Objective #5
Designate in the field trees categorized as weed species and trees categorized as production species
Objective #6
Recite the effects of management upon the quality and quantity of wood in a timber stand
	A. Importance of recognizing natural and economic considerations of timber stand management
	. Natural considerations
	  . site conditions
	    . drainage
	    . aspect
	    . slope
	    . fertility
	    . aspect
	    . climate
	    . seed bed
	  . stand conditons
	    . species composition
	    . size composition
	    . age composition
	    . mortality
	    . prevalence of animal, disease, and insect damage
	    . reproduction potential now and in the future
	  . silvical consideration of trees
	    . growth
	    . form
	    . tolerance
	    . range
	    . seed production
	. Economic considerations
	  . differentiation between locally economically valuable tree species and "Weed" species
	  . products derived from specific tree species
	  . general effects of management upon quality and quantity of wood in a timber stand

EDUCATION

01.0601-02 - Code

MANAGEMENT OF TIMBER STANDS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Classroom discussion B. Field trip to timber management enterprise, either lumber company or pulp paper company with timber holdings.	A. Visit a timber management enterprise and observe all aspects of the operation from the office work to the woods work. B. Have woods management give purpose and scope of their timber stand management practice for the benefit of the class. C. Have company official point out the number of disciplines required to successfully operate a timber stand management operation.	A. Have students write a report on the field trip based on questions given by the instructor.
A. Field lecture at a number of different sites to see different conditons of stand and site. B. Major emphasis should be placed on 1 - a,b,c and 2-c	A. Students to observe a variety of timber stands . Well managed . Poorly managed . Unmanaged . Different site conditions B. At each stand require students to categorize site and stand conditions. C. Instructor should predict future stands based on present conditions at earlier sites visited. D. Students will predict future stands at later sites visited.	A. Have each student predict the potential stand on a site.

OBJECTIVES BY UNIT	CONTENT
Unit 3 - Silvicultural Treatments Objective #7 Recite _______ ways to upgrade number wood quality and quantity of a stand through intermediate cuttings. Objective #8 Recite the objective and justification for intermediate cuttings in a timber stand	A. Intermediate Cuttings . Purpose - to upgrade wood quality and quantity of a stand by: . removal of undesirable trees . check succession of undesirable species . salvage . culling for higher quality within a species . to improve spacing to yield greater volume and quality on fewer crop trees . protection by removal of diseased or insect infested trees, or to decrease fire hazard, or to improve access . Objective - to upgrade stand to include only economically justifiable species and/or individual trees within a given site condition. To benefit crop trees. Justification - natures course in succession of species is not always the most lucrative means financially for a timber stand operator. Natural selection is often not as efficient or effective for man's purposes as is his own soundly based selectivity.
Objective #9 Recite the meanings of economic and biological maturity in a timber stand managed for a financial goal. Objective #10 Write one plan each for a liberation cut, cleaning and weeding operation . Adequate control over timing and extent of such release cuts . Methods and tools to be used . Specification of manpower deployment Objective #11 Demonstrate ability to implement a prescribed release cutting successfully and safely to instructor's standards of efficiency and effectiveness by marking trees in a stand that are to be removed	B. Kinds of Intermediate Cuttings . Release cuttings - remove undesirable trees when they have reached economic maturity . Balance profitability of weed trees against the financial opportunity lost while they continue to occupy space that could be occupied by a favored species of good form and growth potential . cleaning and liberation cuts - made prior to sapling size to release an understory of favored species from an overtopping story of similar aged trees (cleaning) or of older trees (liberation) . weeding - freeing crop trees from all competing vegetation regardless of species . timing and extent of release cuts . methods and tools of regulating a stand through release cuts . cutting . girdling . herbicides . spraying . injecting . stump painting

01.0601-02 - Code

MANAGEMENT OF TIMBER STANDS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Field lecture B. Stress silviculture as the application of technology to a forest stand to encourage it to produce what you need C. Field lecture in timber stands where the need for intermediate cutting is evident. D. Compare with well managed stand (use increment borer to compare growth)	A. Students should understand why silvicultural practices can be profitable over a long period of time. B. Student observation of examples of natural and artificial processes of intermediate cuttings. C. Student should be made aware of the improvement man can make over nature.	A. Students should be able to recite types and purposes of intermediate cuttings. B. Oral quiz in field.
A. Field lecture . A timber stand where release cutting has not been done . A timber stand where release cutting was recently done . A timber stand where release cutting was done several years prior B. Student plan	A. After observing samples of timber stands students will prepare plans for each form of release cutting discussed B. Students will implement one of these plans on a tract of land of a size to complete in one period. C. Marked trees will not be removed (to be removed in module on "Harvesting Timber and Pulp")	A. Teacher observation B. Students term in plans.

OBJECTIVES BY UNIT	CONTENT
Objective #12 Demonstrate in the field ability to designate trees that are of poor species, poor form, over mature or in danger of mortality due to factors other than crowding. Objective #13 Write one plan each for an improvement cutting and a salvage cutting to include timing and extent of each operation, as well as the general plan of operation. Objective #14 Demonstrate ability to implement an improvement cutting plan or a salvage cutting plan by marking trees for removal.	. Improvement Cuttings - made beyond the sapling stage to improve stand composition and quality by removing undesirable individual and species (poor form, poor species, over mature trees). . salvage cuttings - made to remove trees in danger of mortality due to factors other than through competition from other trees. . timing and extent of improvement cuttings when injury to trees is threatened as with appearance of outward signs of disease when injury or death has occurred (as with wildfire - salvage as soon as possible, before ensuing spring with coming of insects and fungi) . methods and tools of regulating a stand through improvement and salvage cuttings.
Objective #15 Designate under field conditions trees within a stand that should be pruned and timber stands that are in need of pruning. Objective #16 Recite _______ objectives of number artificial pruning. Objective #17 Write a plan of operation for a pruning exercise on a specific timber stand site including timing, extent, equipment, manpower, and specifications of tree types to be pruned. Objective #18 Demonstrate ability to implement a pruning plan by marking trees to be pruned.	. Pruning . objectives of artificial pruning . natural pruning . death . shedding of dead wood . healing over . sound and unsound knots . timing and selection in artificial pruning . procedure and tools for artificial pruning

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Continue with same procedures as outlined in 3-b above. B. Field lecture and demonstration.	A. Students observe samples of timber stands, both in need of improvement cutting and those already improved. B. Students to prepare plan for and improvement cutting as discussed. C. Students implement their plan on a suitable tract of land (1 period completion time) D. Do not remove trees. E. Dissect tree for student observation of benefits and results of pruning. F. Actual pruning can be obtained in module on "Maintenance and Management of Forest Plantations" G. Students to prepare and implement plan for pruning a tract of timber.	A. Students turn in plans. B. Quiz on objectives of pruning. C. Teacher observation.

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Harvesting and regeneration methods Objective #19 Recite ______ natural factors number effecting the regeneration of a timber stand (including site, climate, animal, insect and disease). Objective #20 Recite ______ ways artificial number regeneration may be carried out Objective #21 Demonstrate, in the field, the ability to prescribe for satisfactory regeneration in a timber stand under management.	A. Regeneration (natural) Timber stand regenerates itself through natural seeding. . Natural regeneration dependent on: . seed source . germination . early survival of seedling . Problems of natural regeneration . lack of seed source . poor seed year . lack of moisture . lack of acceptable duff and/or mineral soil condition for desired species . seed-eating birds and rodents . other site factors . Supplementary artificial regeneration . direct seedings . broadcast seeding . strip and spot seeding . planting . Site preparation (reduction of competition and preparation of soil for regeneration) . slash disposal . scarification and removal of competition . prescribed burning . mechanical cleaning . soil treatment . fertilization . drainage and/or irrigation

EDUCATION

01.0601-02 - Code

MANAGEMENT OF TIMBER STANDS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Field and/or classroom lecture.	A. Students will observe a site where natural reseeding is taking place. B. Students will observe a site which should be prepared before artificial regeneration. (Actural clearing and seeding could be done if a suitable site is available and if a tie-in could be made with one of the modules on Equipment Operation).	A. Written quiz.

OBJECTIVES BY UNIT	CONTENT

Objective #22
Recite for each harvesting system covered in class:
. Special pattern of cutting
. Rate of removal
. Management practices followed
 	
Objective #23
Write a harvest plan for a given timber stand of _______ acres
number
using one of the harvesting systems covered in class, or a variation of a harvesting system.
 	
Objective #24
Demonstrate ability to implement such a plan by marking the trees in the stand to be cut.
	B. Harvesting (silvicultural) systems
	A "system" designates a planned program of silvicultural treatment during the whole life of a stand; it includes not only the reproduction cuttings but any intermediate cuttings. "... consists of a number of steps conducted in logical sequence." (Smith: 353)
	. Differences between systems:
	  . special pattern of cutting
	  . rate of removal (number of harvest cuts)
	  . management of even or uneven aged stand
	. Objectives to consider in choosing a particular system:
	  . goals
	  . recognition
	  . growth and yield
	  . silvic considerations
	  . efficiency of operation
	. Clear cutting method
	  . removal of all trees regardless of size
	  . resulting stand composition
	  . when to use
	  . clearcutting with artificial reproduction
	  . clearcutting with natural regeneration (cutting patterns used)
	  . advantages and disadvantages of the system
	  . application of the system and its modifications
	. Seed-tree method
	  . method entails harvesting all but a few crop trees - these serve as seed trees to be harvested once the site is adequately regenerated
	  . resulting stand composition
	  . seed tree selection, quantity of and distribution
	  . seed tree removal
	    . economic feasibility
	    . damage to residual stand
	  . when to use
	  . advantages and disadvantages of the system
	  . application of the system and its modifications

01.0601-02 - Code

MANAGEMENT OF TIMBER STANDS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Field and classroom lecture. B. Take students to different sites where different systems would work.	A. Student observation of sites both cut and uncut. B. Students should write out a harvesting system for a given work area in a timber stand (an area of at least 5 acres to coordinate with module on "Harvesting Timber and Pulp"). Mark the trees to be cut during the next harvest cutting.	A. Students turn in harvest plan for evaluation.

Code - 01.0601-02

Title - MANAGEMENT OF TIMBER STANDS

OBJECTIVES BY UNIT	CONTENT
	. Shelterwood method . method entails establishment of regeneration through a series of harvest cuts resembling heavy thinnings. The cuts cover a short period of the rotation. Regeneration is complete before the cutting is completed and is actually released with each cutting. . resulting stand composition . stages of cuttings (preparatory, secd, and removal cuttings) . when to use . advantages and disadvantages of the system . application of the system and its modifications

01.0601-02 - Code

MANAGEMENT OF TIMBER STANDS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES

MODULE OF INSTRUCTION

Title - MANAGEMENT OF TIMBER STANDS Code - 01.0601-02

RESOURCE MATERIALS

Bulletins:
Cope, J. A. & Fred E. Winch, Jr., "Woodlot Improvement-Managing the Woodlot". Cornell 4-H Club, Bul. #43.
Dickson, Alex. "Management of Small Woodlands in N.Y." NYS College of Ag., Cornell Ext. Bul. #1125.
"Prune For Quality". NYS Conservation Dept., Div. of Lands & Forests Forest Management leaflet #4.
"Use of Chemi-killers." NYS Conservation Dept., Div. of Lands & Forests. Forest Management leaflet #3.
"Let's Manage Some Blue Ribbon Hardwoods." Michigan State University Coop. Ext. Service, Bul. E624, Natural Resources Series, April 1969.
"Reproducing Jack Pine by the Shelterwood Method." Michigan State University Ag. Exper. Station Research Report, No. 110, March 1970. East Lansing, Michigan.
"Forestry Research - A Progress Report", International Paper Co., 16 pp.
"Measuring and Marketing Farm Timber" Bull. 1210 U.S. Dept. of Ag. 33 pp., 1958
"Logging Facts for Small Operators", Tennesee Valley Authority Division of Forestry Relations, 13 pp., 1953.
"Special Forest Products for Profit", U.S. Department of Ag. Forest Service Bulletin 278, 63 pp., 1963

Books:
Baker, Frederick S., Principles of Silviculture. McGraw-Hill Book Co., Inc. New York. 414 pp. illus.
Davis, Kenneth P., American Forest Management. McGraw-Hill Book Co., Inc. New York. 482 pp. illus.
Forestry Handbook; edited by Reginald D. Forbes. The Ronald Press Co. (available in Ben Meadeows catalog at about $15.)
Smith, David M. The Practice of Silviculture. John Wiley & Sons, Inc., New York. 578 pp. illus.
Stoddard, Charles H., Essentials of Forest Practice. Ronald Press Co., New York. 366 pp. illus.
Management of Forest Resources for Multiple Use. Available through IMS, Cornell. 124 pp. illus.

MODULE OF INSTRUCTION

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT Code - 01.0602-01

DESCRIPTION:

Campground development is explored from the point of local demand, types of facilities that could be established, site selection, financial aid available and the costs of development. The maintenance of a campground operation is examined in line of manpower needs and finances. The students will be guided through the various steps necessary to set up a campground section of land and how to avoid problems through good campground design.

	MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
		Class	Other
1.	Types of campgrounds and recreational facilities	2	
2.	Business considerations	3	3
3.	Selection of campground site		8
4.	Site design and layout		14
		5	25

Revised June, 1974

MODULE OF INSTRUCTION

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT Code - 01.0602-01

OBJECTIVES to be obtained:

The student will be able to:

1. Complete a survey of the existing recreation facilities in the area.
2. Analyze the potential for recreation facilities in his home area.
3. Compare the income potential from various types of campgrounds.
4. Develop a program to effectively utilize the financial and technical assistance of federal, state, and local agencies in the development of a campground.
5. Develop an effective budget showing income and costs of developing and operating a given existing area as a proposed campground.
6. Recognize and effectively meet the campground operator's personal responsibilities, regarding: liability, property, and compensation insurance.
7. Utilize modern advertising methods to effectively promote a campground to the public.
8. Recognize and effectively satisfy all local, state, and federal laws pertaining to a given campground enterprise.
9. Recognize external factors of travel time, proximity to demand, type of demand, state and local laws and regulations, competition, financing, etc. in selecting a site for a campground; utilizing maps, regional plans, governmental law codes, labor department statistics, review of governmental and private assistance programs.
10. Recognize internal factors of physical features of the site, presence of natural attractions, expansion area, ease of access, water supply, vegetation, etc. in selecting a site for a campground.
11. Carry out an effective (to instructor's standards) inventory of a proposed campground site.
12. Demonstrate ability to develop, with inventory data and printed material re: campground facilities and layout specifications, a workable campground site design, considering, to the instructor's standards:
    a. Carrying capacity of the site
    b. Types of facilities included
    c. Design of all roads, buildings, campsites, water sewerage facilities, trails, platforms, fire places, rubbish disposal facilities, benches, stables, safety regulation devices, signing and lighting.
    d. Design of all cultural treatment of vegetation including removal of hazardous vegetation, landscaping, scenic visits, road day lighting, campsite daylighting, barriers, lawns, and erosion control.

Code - 01.0602-01

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
Unit # 1 - Types of campgrounds and recreational facilities Objective 1 Complete a survey of the existing recreation facilities in the area. Objective 2 Analyze the potential for recreation facilities in the home area. Objective 3 Compare the income potential from various types of campgrounds.	A. Definition of Outdoor Recreation . Types of outdoor recreation pursuits. . Demand for various recreation pursuits. . Types of camping and the facilities needed for the various types. B. Introduction to campsite planning, development, and operation. . Business considerations. . Site selection. . Site design and layout and maintenance.
Unit 2 - Business consideration Objective 4 Develop a program to effectively utilize the financial and technical assistance of federal, state, and local agencies in the development of a campground. Objective 5 Develop an effective budget showing income and costs of developing and operating a given existing area as a proposed campground. Objective 6 Recognize and effectively meet the campground operator's personal responsibilities, re: liability, property, and compensation insurance.	A. Assistance: financial and technical . Types of assistance. . Federal, State, Local and Private Agencies. . How to apply for assistance. . Conditions of Assistance. B. Costs of Development . Fixed costs - depreciation insurance taxes licenses interest on loans . Variable costs utilities maintenance supplies repairs Labor advertising construction . Budgeting purpose of forms use for evaluating expansion on enterprise.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Classroom Lecture Supervised Study (1: 11-23) (5: 10-11) (7) (8), (14), (16), (25), (28) (20: 4-7) (21)	After initial discussion the students will help list the recreation facilities of all types in his home area and the potential for additional facilities.	
Classroom Lecture (same references)	Student will be assigned a potential campground site that they may use for lab exercises. (School land if available would be best).	
Field Lecture (1: 25, 42-43) (2: 27-31) (4) (13: 25-26) (23: 12) (24: 18) (26)	Students to list and locate nearest offices of agencies both public and private involved in campground development.	
(1: 24-25, 40-41) (11) (13: 18-19) Field trip to privately owned campground (14) Field Lecture (17) (23: 5-10) (20: 18-19) (22)	If possible visitcampground in operation. If owner is willing let students prepare a budget showing costs and income for the enterprise during the past year.	Hand in budget for evaluation.

Code - 01.0602-01

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Objective 7 Utilize modern advertising methods to effectively promote a campground to the public.	C. Insurance . Liability . Negligence . Responsibility of operator for visitor safety . Accident prevention . Liability reduction . Types of insurance policies . Insurance contracts . Costs
Objective 8 Recognize and effectively satisfy all local, state, and federal laws pertaining to a given campground enterprise.	D. Promotion . Purpose and value of . Advertising media . Costs E. Public Laws . Health codes . Building codes . Zoning . Protection for visitors . Laws of regulation . Laws providing assistance . Tax laws

EDUCATION

01.0602-01 - Code

CAMPGROUND DEVELOPMENT AND MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
(11) T.R. Classroom Lecture Guest Speaker from insurance company (3) (7: 18-19)	Students take notes from guest speaker.	
Classroom Lecture (17) Guest Speaker - a campground operator who has used advertising. (13: 24) (20: 15-17, 26-30) Student report - Classroom Lecture (1: 25) Field trip (2: 23-24) Student Report	Students prepare advertising campaign for all media in area. Assign students one medium to call or see as to costs involved. Hand in written advertisement. Student crews to list all local state, and federal laws influencing planning, development and operation of a campground enterprise.	Evaluate student advertisements for completeness and appeal.
	Assign certain students to contact local government authority to obtain information on zoning, building codes, health codes and tax rates on a campground enterprise.	
	Have students report to class.	

Code - 01.0602-01

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Unit 3 - Selection of Campground site Objective 9 Recognize external factors of travel time, proximity to demand, type of demand, state and local laws and regulations, competition, financing, etc. in selecting a site for a campground; utilizing maps, regional plans, governmental law codes, labor department statistics, review of governmental and private assistance programs.	A. Reasons for carefully selecting a site . To insure sufficient demand for facilities . To insure satisfactory site conditions for camping use. B. External factors to consider . User travel time to site . Proximity to population centers. . Type of demand . State and local laws and regulations. . Competition . Availability of financing
Objective 10 Recognize internal factors of physical features of the site, presence of natural attractions, expansion area, ease of access, water supply, vegetation, etc.: in selecting a site for a campground.	C. Internal factors to consider . Physical features of the site. . Natural attractions. . Expansion area. . Ease of access. . Water resources. . Vegetation. . Ease of development. . Ease of maintenance.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field Lecture on site of potential campground area to be used for instructional purposes throughout the module (13:12) (If possible select instruction site on property of student who is interested in developing his own campground or on school property.)		
Field Lecture (1: 6-7) Student Report due 6th day (2: 21-24) (5: 12-14) (6: 5-6) (7:11-13) (13: 8-11) (20: 2-3)	Student crews to observe the site and maps and prepare written reports on conditions of factors external to the site.	Evaluate report as to thoroughness and accuracy.
(1: 7-11, 28-30) (13: 9-11) Field Lecture (20: 2-3) Student Report due 6th day.	Student crews to observe the site and prepare written reports on conditions of factors internal to the site.	Evaluate report as to thoroughness and accuracy.

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Site design and layout Objective 11 Carry out an effective (to instructor's standards) inventory of a proposed campground site.	A. Purpose of proper design and layout of site. • Economic layout. • Ease of maintenance. • Effective, efficient, safe functioning of facilities, access, etc. • Accommodation for expansion. • Cost accounting.
Objective 12 Demonstrate ability to develop, with inventory data and printed material re: campground facilities and layout specifications, a workable campground site design, considering, to the instructor's standards: • Carrying capacity of the site • Types of facilities included • Design of all roads, buildings, campsites, water sewerage facilities, trails, platforms, fire places, rubbish disposal facilities, benches, stables, safety regulation devices, signing and lighting. • Design of all cultural treatment of vegetation including removal of hazardous vegetation, landscaping, scenic visits, road day lighting, campsite daylighting, barriers, lawns, and erosion control.	B. Inventory of site by mapping • Plane table survey. boundaries contours water and vegetation features existing cultural developments scenic and other attractions. • Observation natural hazards recommended water resources and placement " placement of sanitation facilities " placement of road and trail systems " access to site " recreation activities to be accommodated " cultural treatments of vegetation " cultural treatments to the land surface " cultural treatments of water resources.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
(1: 26) Field Lecture		
(1: 26) Field Lecture (29) Field demonstration Work experience	Student crews to conduct plane table survey site and prepare a map and written report to be submitted for instructor evaluation. Field and classroom.	Evaluate report

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Objectives (continued) Objective 11 and 12 from previous page.	C. Design & Layout . Drafting locations and specifications of facilities. roads buildings campsites water and sewage rubbish disposal lighting administrative structures maintenance " " trail systems " " tent platforms " " fire place " " benches & tables " " . Drafting location and specifications of Land & Vegetation treatments. landscaping land contouring land leveling excavation compost pile plantings lawn and turf seeding slash disposal vegetation barriers disease, insect, and pest control daylighting roads trails and camping sites vista cuttings . Planning maintenance and services water supplies pollution control sewerage cleanup fuel wood laundry store electricity garbage disposal law & regulation enforcement

CAMPGROUND DEVELOPMENT AND MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field and Classroom Lecture (1: 30-32) (20: 8-12) (6: 6-25) Work Experience (7: 15-19, 25) Student reports (10), (12) (13: 13-20) (18:), (27) (24)	Student crews prepare maps to show proper layout of campground facilities and feature drafted specifications of individual facilities and features. Written and drafted work to show all cultural treatments to soil, water courses, and vegetation.	Evaluate report to instructors standards.
(1: 31) Field and Classroom Lecture (20: 23-25) Work Experience (29) Student reports		
(1: 32, 36-37) Field & Classroom Lecture (6: 25-33) Work Experience (7: 14-15) Student reports (9) (13: 21-23) (15) (19) (20: 20-22) (29)	Student crews to prepare a workable plan to instructor's standards, for the daily, seasonal, and annual procedures for the maintenance of the site and for the providing of services to users.	Evaluate report to instructor's standards.

MODULE OF INSTRUCTION

Title - CAMPGROUND DEVELOPMENT AND MANAGEMENT Code - 01.0602-01

RESOURCE MATERIALS

A. Periodicals -

25. "The Crisis in Outdoor Recreation." Marion Clawson. Resources of the Future, Inc. In American Forests, March and April 1959

33. "Better Camping" - Kalmbach Publishing Co. 1027 North 7th Street, Milwaukee, Wisconsin 53233 - $4 per year.

B. Bulletins -

1. U.S.D.A. "Rural Recreation Enterprises for Profit", Agriculture Information Bull. 44, pp. illus. (US Government Printing Office 20¢) (1963)

2. Ibid. "Rural Recreation - A new family-farm business", Report of task force on Income-Producing Recreation Enterprises on Farm Land . 56 pp. September 1962 (US Government Printing Office 25¢)

3. New York State College of Agriculture. "Water Safety", Cornell Ext. Bull 1131, 8 pp. illus. May 1964. (single copy free, 10¢ each)

4. USDA. "Technical Help for Outdoor Recreation - Assistance available from the Soil Conservation Service", Soil Conservation Service SCS-CI-16, 4 pp. 1969.

5. Department of Travel and Publicity of the Province of Ontario, Canada. "Fishing and Hunting Resorts in Ontario:, 31 pp. illus. (District Office; Ontario Government Building; 353 Richmond St.; London, Ontario, Canada

6. "Campsites and Trailer Parks - Planning, Development, Operation." Department of Travel and Publicity of the Province of Ontario Development Branch; 67 College St., Toronto, Ontario; Canada. 34 pp. illus.

7. "How to Develop a Campground." Vermont Extension Service, University of Vermont, Burlington, Vermont PR 364, Brieflet 1095.

8. Conservation Circular from Fernow Hall; NYS College of Agriculture, Cornell University. "Income Potential From Recreation Enterprise." Vol. 6, No. 4, October, 1968.

B. Bulletins - (continued)

9. Ibid. "Native and Naturalized Trees for Rural and Roadside Beauty." Vol. 6, No. 4. October, 1968.

10. Department of Agricultural Engineering, NYS College of Agriculture, Cornell University, Ithaca, New York Packet of Agricultural Engineering Leaflets, RRD 1 through 19.

11. "Liability and Insurance Protection in rural recreation enterprises." Cooperative Extension Service of Michigan State University. Extension Bulletin 580, tourism and recreation, July 1967.

12. "Private Campgrounds in NYS." E.W. Foss. Department of Agricultural Engineering; NYS College of Agriculture; Cornell University; Ithaca, New York Agricultural Engineering Extension Bulletin 377. 15 pp. illus.

13. "Forest Recreation For Profit." U.S. Department of Agriculture, Forest Service; Agricultural Information Bulletin No. 265. U.S. Government Printing Office; 1962. 27 pp. illus.

14. Cooperative Extension; NYS; Cornell University - State University of New York - U.S. Department of Agriculture; College of Agriculture, Department of Rural Sociology; Warren Hall; Ithaca, New York 14850. "Campgrounds and Picnic Areas. " RRD No. 2.

15. Ibid. "Services as Part of the Campground Enterprise." RRD No. 6.

16. Ibid. "The Consumer - The Camper,"   RRD No. 8.

17. Ibid. "Publicity and Advertising."   RRD No. 9.

18. Cooperative Extension, NYS College of Agriculture; Cornell University; Ithaca, New York, "Layouts and Standards for Campgrounds."

19. Ibid. "Requirements in Regard to Health, Safety and Insurance."

20. "Family Camping Area Management Conference." March 3-4, 1967. Morrison Hall, Cornell University; Ithaca, New York.

21. "Directory of Private Family Campgrounds In New York State." Compiled by the Outdoor Recreation Sub-Committee; March 1, 1965. New York State College of Agriculture, Cornell University, Ithaca, New York RRD No. 10.

22. "Budgeting Farm and Ranch Recreation Enterprises." Federal Extension Service, U.S. Department of Agriculture, Washington, D.C. (Prepared by Glen J. Vollmar, Extension Economist, Farm Management, Ag. Science, Technology and Management Division; Federal Ext. Service, USDA, Washington D.C.)

B. Bulletins - continue (third page)

23. "Private Campgrounds as an Alternative Use of Land." Carl J. Holcomb, H. E. Conklin, and Fred E. Winch, Jr. New York State College of Agriculture, Cornell Extension Bulletin 1112 (25¢) 15 pp.

24. "Conservation - Guide for Planning and Organizing Occupational Programs" The University of the State of New York; The State Education Department, Bureau of Secondary Curriculum Development; Albany, New York 12224 42 pp. illus.

25. "Federal Assistance in Outdoor Recreation" Department of the Interior; Bureau of Outdoor Recreation; Washington, D.C. 20240. 41 pp. (for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20302 Price 20¢

26. "Working Drawings of Basic Facilities for Campground Development." U.S. Department of Agriculture - Forest Service. Agriculture Information Bulletin No. 264, August 1962, 23 pp. illus.

27. "Action for Outdoor Recreation for America" Citizens Committee for the Outdoor Recreation Resources Review Commission Report. 1001 Connecticut Avenue, Washington, D. C. 20036. Price 25¢ each, 10 or more copies, 10¢ each, 33 pp. illus.

28. Summary of the O.R.C. Reports Catalog 62-60017 from Superintendent of Documents, Washington, D.C. 20402 Price $1.00

29. Ten Pamphlets from Community Action Guide for Public Officials National Association of Counties Recreation Foundation, 1001 Connecticut Avenue, N.W., Washington, D.C. 20036 Price $1.00

30. Outdoor Recreation Space Standards a Plan. Department of the Interior Bureau of Outdoor Recreation, Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 Price 45¢

31. Outdoor Recreation for the Physically Handicapped, New York Environmental Conservation Department, 55 Wolff Road, Albany, New York

32. "How to Build and Operate Private Family Campgrounds" Bill Reviere - Kalmbach Publishing Company, 1027 N. Seventh Street, Milwaukee, Wisconsin 53233.

PICNICKING

National Park Service

Entrance: Single access road
Size: 90 to 120 sites per picnic ground
Roads: Preferably one-way treated; parking for multiple-car parking
Barriers: Only if necessary to confine vehicles
Sanitation: U.S. Public Health Service Standards
Comfort Stations: Flush type is preferred, pit type acceptable if cost of water and sewage disposal is excessive. One station per 30 picnic sites with two water closets and one urinal for men, three water closets for women, two lavatories (1 each sec) location within 500 feet of each unit (site)
Drinking Fountain: 150 feet from site
Garbage Cans: In nontip rack near circulation road, at a maximum of 150 feet from picnic sites
Charcoal Burner: one burner per two tables
Sites: One table and bench combination per site
Space Utilization:
  Family Groups - 6-8 tables/acre; 60% of picnic area
  Organized -12-16 tables/acre; 40% of picnic area

Forest Service

Roads: At least 100 feet from stream
Center of Picnic Sites: Staked not less than 50 feet apart; 50-75 from road
Comfort Station: Flush type, located within 300 feet of every unit
Fireplace or Grill: One per picnic site
Water: One hydrant for four sites.

Soil Conservation Service

Average Number of People per Picnic Table: 5
Number of Tables per fireplace or grill: 1 to 3
Number of Tables per refuse can: 2 to 3
Space Utilization:
  Family Groups - 8 to 10 tables per acre
  Organized -16 tables per acre
Comfort Station: 50 to 150 people per toilet

Corps of Engineers

Average Number of People per picnic table: 5
Unit Design: 20 people per unit of 4 tables, 1 fireplace, 1 trash can, and site preparation
Shelter: One shelter per 25 picnic units, with 8 tables and 2 fireplaces per shelter
Forty visitors per shelter

MODULE OF INSTRUCTION

Title - SUMMER RECREATION AREAS - OPERATION AND MAINTENANCE Code - 01.0602-02

DESCRIPTION:

The student is exposed to all facets in the operation and maintenance of various kinds of summer recreation sites (exlusive of campgrounds) by visiting area commercial recreation sites, and by critically analyzing, on each site, a set of factors relating to physical facilities, business administration considerations, and clientele services.

The student is responsible for development of a written and graphic representation of the layout, operation, and maintenance of a hypothetical summer recreation enterprise on specified site.

(Note to instructor - see apendices # I & # II.)

DIVISIONS OR UNITS OF CONTENT	Time Allocation	
	Class	Other
1. Introduction to the study of summer recreation area operation and maintenance	2	0
2. Inventory and analysis of summer recreation site facilities	6	6
3. Planning the layout, operation, and maintenance of a summer recreation site.	10	6
	18	12

Revised June, 1974

MODULE OF INSTRUCTION

Title - SUMMER RECREATION AREAS -
OPERATION AND MAINTENANCE

Code - 01.0602-02

OBJECTIVES to be obtained:

The student will be able to:

1. List, orally or in writing, 18 out of 20 basic types of outdoor land and water based recreation activities that may be offered at a summer recreation site.

2. List, orally or in writing, major categories of concern in the operation of a summer recreation area.

3. Accurately and completely inventory a summer recreation area in terms of: physical facilities; business administration; clientele services.

4. Constructively analyze a completed inventory form in making accurate statements in the form of:

    1. recommendations for change
    2. analysis of job skills required of employees
    3. notation of data representing examples of efficiency and/or effectiveness in the operation of an enterprise

5. Conduct an effective survey of topographic and commerical factors in the preparation of a feasibility report regarding the development of a summer recreation enterprise on a given site.

6. Develop a site design (graphic) for a summer recreation enterprise located on the given site.

7. Specify in writing all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise regarding is physical facilities, business administration, and its activities as concerns its clientele.

Title - SUMMER RECREATION AREAS -
OPERATION AND MAINTENANCE

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Introduction to the study of summer outdoor recreation area operation and maintenance. Objective 1 List, orally or in writing, 18 out of 20 basic types of outdoor land and water based recreation activities that may be offered at a summer recreation site.	A. Common enterprises serving the summer outdoor recreation needs of the public. . Horsebackriding enterprises . Campgrounds . Golf courses . Marinas . Swimming beaches . Hunting preserves and guide services . Fishing preserves and guide services . Dude ranches . Farm vacation enterprises . Scenic and nature study tours

Unit 1 - (continued)
Objective 2
List, orally or in writing, major categories of concern in the operation of a summer recreation area.
	A. Major categories of concern in the operation of a summer recreation area.
	. Physical facilities
	  . electrical
	  . plumbing and water supply
	  . heating
	  . sewerage
	  . access
	  . structures
	  . power Machinery and Motorvehicles
	  . refuse disposal
	  . recreational surfaces
	  . environmental impact
	  . domestic and wild stock
	. Business Administration
	  . costs of Development and operation
	  . labor
	  . legal considerations
	  . promotion
	  . influences on user volume
	. Clientele Services & Consideration
	  . user services
	  . user control
	  . emergency provisions
	  . special seasonal problems

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk – talk Bulletin board displays Slides	A. Student participation in discussion regarding 20 basic types of summer outdoor recreation activities generally preferred by the American public. List of activities may be altered or expanded to suit student and/or instructor preferences. B. Observation of slides and/or pictures of summer outdoor recreation activities. Students may be asked to prepare a presentation of pictures depicting the various summer outdoor recreation activities.	A. Oral or written exam to achieve 90% accuracy and/or appraisal of student presentations (scrapbook) regarding attractiveness and completeness to instructor's standards.
Handout copy of summer recreation site inventory form to each student for home study.	A. Participation in discussion of scope and importance of each of the major categories of the summer recreation enterprise.	A. Oral or written exam to achieve 90% accuracy.

01.0602-02

Title - SUMMER RECREATION AREAS –
OPERATION AND MAINTENANCE

OBJECTIVES BY UNIT	CONTENT
Unit 2 - Inventory and analysis of summer outdoor recreation site facilities. Objective 3 Accurately and completely inventory a summer outdoor recreation enterprise in terms of: Physical facilities Business Administration Clientele Services.	A. Inventory through field tally, of all factors relating to operation and maintenance of a summer outdoor recreation enterprise using inventory form provided.
Unit 2 - Objective 4 Constructively analyze a completed inventory form in making accurate statements in the form of: A. Recommendations for change B. Analysis of job skills referred of employees C. Notation of data representing examples of efficiency and/or effectiveness in the operation of a specific enterprise.	A. Instructor led analysis of field data inventory forms re: . Recommendations for change within the enterprise to improve effectiveness, efficiency, and/or safety of the operation. . Enumeration of job skills needed by the operation and staff members to successfully operate and maintain the operation. . Notation of data representing examples of efficiency and/or effectiveness in the operation.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
3. Field trips - work experience recreation enterprise operator lecture - discussion Interviews by students with operator. Field tally from data collection. Recommend one full class period per enterprise visited. Recommend minimum of three visits to different summer recreation sites for inventory.	A. Students participate in questioning enterprise operator and in observing enterprise facilities in the gathering of field data on the provided inventory form.	A. Instructor evaluate student work regarding: . Rate of constructive participation in gathering of field data through observation and questioning. . Review of field inventory from for neatness, completeness, and accuracy.
4. Lecture - discussion in class. (Recommend three separate full class sessions devoted to analysis of visited enterprises - one session to follow each visitation) Field report.	A. Student prepares and submits report based on field data accumulated and analyzed.	A. Instructor evaluates studentreport regarding: neatness completeness accuracy constructiveness depth of involvement- to instructors standards.

Title - SUMMER RECREATION AREAS -
OPERATION AND MAINTENANCE

OBJECTIVES BY UNIT	CONTENT
Unit 3 - Planning the development, operation, and maintenance of a summer recreation site. Objective #5 Conduct an effective survey of topographic and commercial factors in the preparation of a feasibility report regarding the development of a summer recreation enterprise on a given site.	A. Survey of and a report on a specific summer recreation enterprise proposal regarding: . Site Conditions slope aspect elevation soil water vegetation climate access scenic values other . Business Considerations existing area enterprises consumer demand proximity to population centers proximity to supporting services and utility suppliers proximity to supporting scenic or commercial attractions local zoning ordinances taxes insurance labor market alternative uses of site

SUMMER RECREATION AREAS -
OPERATION AND MAINTENANCE

- Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
5. Lecture and discussion Field trip to example site Work experience Cite a business analysis form or guide to be used by students. Road maps Demographic maps Use facilities of local government and utilities for supporting data.	A. Student conducts site evaluation and analyzes business considerations on site, at offices of utilities and government, through interviews with area planning and business officials.	A. Instructor evaluates student written report regarding accuracy and relevency of treatment of each factor listed under site conditions and business considerations.

Title - SUMMER RECREATION AREAS -
OPERATION AND MAINTENANCE

OBJECTIVES BY UNIT	CONTENT
Unit 3 - Planning the development, operation, and maintenance of a summer recreation site. Objective #6 Develop a site design (graphic) for a summer recreation enterprise located on the given site.	A. Drafting map of site development depicting: Location of all physical facilities Location of all pertinent natural features Location of all utilities and access routes Location of all property and use boundaries
Objective #7 Specify in writing all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise regarding its physical facilities, business administration, and its activities as concerns its clientele.	A. Completion of all pertinent data covered on the enterprise inventory form. Student completes the inventory from using his own design and development data, and has learned information about the operation and maintenance of a summer recreation enterprise.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Demonstration by example Lecture-discussion Work experience	A. Student uses his analysis of site conditions and business consideration; and the enterprise inventory form; in mapping the potential development site and plotting all pertinent physical, natural, utility access, and boundary line features.	A. Instructor evaluation of student design re: accuracy and neatness of mapping accuracy and neatness of detail plotting accuracy and neatness of rationale in overall design of enterprise.
Demonstration by example Lecture-discussion Work experience	A. Student specifies in writing all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise. Student uses the provided inventory form to accomplish this.	A. Instructor evaluation of student inventory regarding rationale and workability of proposed function of example enterprise.

MODULE OF INSTRUCTION

Title - SUMMER RECREATION AREAS - OPERATION AND MAINTENANCE

Code - 01.0602-02

RESOURCE MATERIALS

Bulletins - Campground Management Conference Proceedings 1970. N.Y.S. College of Agriculture, Ithaca, New York

Rural Recreation Enterprises for Profit - U.S.D.A. Agriculture Information Bulletin No. 277

APPENDICES

I. The student should be provided with a list of existing modules that provide supporting skills needed in successful employment in summer recreation area development, operation, and maintenance. The student should be advised that he should develop with his guidance director a plan for scheduling participation in these modules prior to graduation.

A tentative list of those modules which might be taken is included below:

01.01010103-01	Horses - Handling the foal
-04	Horses - Harness training
-13	Horses - Care of tack and equipment
-21	Horses - Care of feet and legs
01.0101010703	Livestock Sanitation, Health, and Diseases
-01	Internal Parasites
-02	External Parasites
-03	
-04	Emergency care
-05	Dipping, Bathing, and Dusting
01.0101010705-01	Legal Rights and Transporting of Animals
01.01010602-01	Proper Livestock Housing
01.0206-01	Recordkeeping I for Agricultural Business
-02	Recordkeeping II for Agricultural Business
-03	Analysis of Agricultural Business Records
01.0207-01	Securing Employment and Employee Responsibilities
-02	Personnel Management for Agricultural Business
01.0211-03	Finance and Credit Systems for Agricultural Business
-04	Insurance for Agricultural Businesses
-05	Taxes in Agriculture
-06	Legal Aspects of Agricultural Business
01.0299-01	Personal Financial Planning
01.0301-03	Small Engine Service
-14	Operation of Machinery and Equipment
-25	Light Earth Moving Equipment Maintenance
-27	Tractor and Vehicle Operation

APPENDICES

(continued)

01.0302-01	Planning Agricultural Structures and Service Facilities
-02	Construction and Improvement of Agricultural Structures
-03	Use and Maintenance of Agricultural Structures
01.0307-01	Electrical Fundamentals for Agriculture
01.0504-01	Landscape Design
-02	Constructing Landscape Features
-05	Implementing Landscape Plans
-06	Maintaining Woody Shrubs in Landscape
01.0602-01	Campground development and management
-03	Winter Recreation Areas - Operation and Maintenance
01.0603-01	Soil Science
-02	Soil and Water Management
-03	Soil Erosion Control
-04	Land Measurement
-06	Bulldozer Service and Operation
-07	Backhoe and Loader Service and Operation
-08	Construction of Access Roads
01.0604-01	Conservation Law
-02	Farm and Forest Game Management
-03	Wetland Game Management
-04	Disease and Pest Control
01.0605-03	Water and Sewage Systems
01.0699-01	Public Relations
-06	Conservation Structures - Masonry
-07	Conservation Structures - Carpentry

Appendix II

Format for Summer Recreation Site Inventory

I. Basic Data

Date: ______________________________

Business Name: ______________________________

Location: ______________________________

Proprietor: ______________________________

Address: ______________________________

Phone Number: ______________________________

Recreation Activities and/or Services offered (list in decreasing order of user-day participation):

____

____

____

____

Season of Operation:

Date of Employees report to work ______________________

Date open for business ______________________

Date closed to business ______________________

Date Employees end work ______________________

User Attendance:

1. Average length of stay
2. Average daily attendance
3. Average annual attendance

II. Physical Facilities
- A. Electrical
  1. Number of service entrances by size
  2. List by major categories all draws on current
  3. How often is wiring checked for safety and serviceability
  4. Who installed service and wiring
  5. Who installs future electrical facilities
  6. Who is responsible for regular electrical maintenance

- B. Plumbing and Water Supply
  1. List water sources (drilled or dug well, reservoir, etc.)
  2. List by major categories all draws on water
  3. How often is pump and plumbing checked for serviceability
  4. Who installed pump and plumbing
  5. Who installs future facilities
  6. Who is responsible for regular plumbing maintenance.
  7. How often, how, and by whom is water tested for purity
  8. List water conditioners and treatments used

- C. Heating
  1. Number of heating units by system type
  2. List by major categories all heated spacial areas
  3. How often is heating system(s) checked for safety and serviceability
  4. Who installed heating plant(s) and systems
  5. Who will do future installations
  6. Employee who is responsible for regular heating plant maintenance
  7. List structures by degree and type of insulation

- D. Sewerage
  1. Number of separate sewerage disposal systems by type and capacity
  2. How often is sewerage disposal system(s) checked for serviceability
  3. How is the serviceability of the sewerage disposal system(s) maintained.
  4. Who installed the sewerage disposal system(s)
  5. Who will do future installations
  6. Who is responsible for regular sewerage disposal system maintenance

- E. Access
  1. Note main arteries of travel influencing user access to site
  2. Privately maintained roads and parking areas
     - a) miles or feet of roadway by surface type
     - b) area and parking capacity of parking areas by surface type
     - c) who constructed parking areas and roads
     - d) who will construct future parking areas and roads
     - e) employee responsible for regular maintenance and repair
     - f) list major road bed and parking area facilities (bridging, ditching, drainage, signing, barriers, speed zones, directional signing, etc.)

E. (continued)
- 3. Trails
  - a) miles or feet of trails by use types
  - b) who constructed trails
  - c) who maintains trails
  - d) equipment used in trail maintenance
  - e) who will construct future trails
  - f) travel aids provided along trails (rest areas, signing, bridging, stairways, daylighting, etc.)

F. Structures
- 1. List structures by uses
- 2. Who constructed structures
- 3. Who will do future construction
- 4. Employee responsible for maintenance and repair
- 5. How often are structures inspected for safety and serviceability

G. Power Machinery and Motor Vehicles
- 1. List major pieces of machinery and vehicles by use
- 2. Who operates machinery and vehicles
- 3. Who is responsible for their maintenance and repair
- 4. How often are machinery and vehicles checked and serviced
- 5. List records maintained on machinery and vehicle use and maintenance
- 6. Who keeps and maintains the records
- 7. Who is responsible for supply of fuels, oils, etc.

H. Refuse Disposal
- 1. Method for disposal of garbage
- 2. Method for disposal of trash
- 3. Are garbage and trash separated
- 4. Are refuse containers maintained: secure from animal pests
  - fixed on their spot
  - clean
- 5. Who is responsible for disposal of refuse and litter
- 6. Frequency of and time spent in disposal of refuse and litter
- 7. List any special sanitation problems related to the enterprise
- 8. Annual cost estimate for refuse collection and disposal

I. Recreational Surfaces Development and Maintenance
- 1. Turf
  - a) Turf areas by size and use
  - b) Who installed turf
  - c) How was turf installed
  - d) Who will do future turf installations
  - e) Employee who is responsible for turf maintenance
  - f) How is turf maintained

I. (continued)

2. Beach
   - a) Beach areas by size
   - b) Special designated areas of beach by use type
   - c) System used in controlling user safety
   - d) Legal regulations regarding user safety
   - e) Employee who is responsible for beach maintenance
   - f) Employee who is responsible for user safety

J. Environmental Impact of Operation
1. Influence of local zoning ordinances
2. Influence on vegetation
3. Influence on wildlife
4. Influence on soil and water resources
5. Noise problems
6. Trespass problems
7. Property destruction
8. TV and radio transmission interference
9. Influence on other commercial operations on same site or in same area.
10. Evidence of visual pollution (scenic)

K. Domestic and Wild Stock
1. List types of animal life maintained in the enterprise
2. List major physical facilities maintained for the keeping of the stock
3. Who is responsible for the management and/or maintenance of the stock
4. How, where, and when is the stock obtained
5. List major steps in the annual daily care of the stock
   - a) feeding
   - b) medical
   - c) other (grooming, waste disposal, care of tack, etc.)

III. Business Administration Considerations

A. Costs of Development and Operation
1. Fixed costs
   - a) depreciation
   - b) insurance
   - c) taxes
   - d) licenses
   - e) interest on loans
   - f) other
2. Variable costs
   - a) utilities
   - b) supplies
   - c) maintenance
   - d) labor
   - e) repairs
   - f) promotion
   - g) expansion
   - h) other

III. Business Administration Considerations (continued)

3. Sources of development capital
4. Initial capital investment
5. Planning horizon
6. Annual cash income
7. Net cash income
8. Real vs. Potential income
9. Breakeven estimates
10. Taxes by type
11. Insurance by type
12. Sources of Technical and Financial Assistance
    a) type of assistance
    b) how applied for
    c) conditions of assistance

B. Labor
1. Size of work force
2. Wage scales by position (skill area)
3. Employee benefits
4. Number of work days per year by position
5. Employee turnover rate

C. Legal Considerations
1. Land title: type and problems
2. Landlord and tenant relations
3. Labor Contracts and Laws
4. Liability to Labor
5. Liability to user
6. Drainage and water rights
7. Rights-of-way or easements
8. Fencing of property
9. Posting of property
10. Housing Laws
11. Health Laws
12. Zoning Regulations
13. Laws Providing Technical and Financial Assistance
14. Tax Laws
15. Wildlife Laws
16. Summary of degree of reliance upon services of a lawyer

D. Promotion
1. Media used
2. Annual Cost
3. Person responsible for promotion

E. Influences on user volume
1. Natural scenic or other attractions on or near site
2. Proximity to major population centers
3. Other area recreation enterprises in competition or support
4. Unique attractions or services represented by the enterprise.

IV. User Services and Considerations

A. User Services

1. Rest Room Facilities
   - a) Comment on cleanliness, ventilation, deodorant, lighting; are facilities sufficient to meet volume of user demand
   - b) Who is responsible for rest room maintenance
   - c) Frequency and amount of time spent in restroom maintenance

2. Restaurant-snackbar facilities
   - a) Comment on cleanliness and design of facilities
   - b) Who is responsible for operation and maintenance of dining facilities
   - c) Frequency and amount of time spent in maintenance of dining facilities

3. Overnight accommodations for guests
   - a) Comment on cleanliness and design of facilities
   - b) Who is responsible for operation and maintenance of facilities
   - c) Frequency of and amount of time spent in maintenance of facilities

4. Sport equipment rental, maintenance, and/or repair services
   - a) Types of services and fees charged
   - b) Who is responsible for operation and maintenance of service.

5. Secondary recreation services
   - a) List recreation pursuits offered secondary to the major recreation activities.
   - b) Who is responsible for the operation and maintenance of those secondary recreation pursuits (facilities)

6. User information service
   - a) What system is used to provide information to users
   - b) Who is responsible for providing information

7. User privileges received for fees paid
8. Supervised group programs provided by type

B. User Control

1. Describe system for fee collection
2. Specify provision for supervision of users at high risk points on recreation site
3. Vandalism - type-frequency-control-cost
4. Theft - type-frequency-control, cost
5. User caused fire - type-frequency-control-cost
6. Presence of attractive nuisances on property
7. Presence of hazardous areas on property

IV. (continued)

C. Emergency Provisions
1. First aid or medical facilities
   a) type
   b) person responsible and skills required
2. Fire control
   a) system and equipment
   b) person(s) responsible and skills required
3. Search and rescue (including land and water)
   a) system and equipment
   b) person(s) responsible and skills required
4. Communications System(s)
   a) System(s) and equipment
   b) Person(s) responsible and skills required

D. Special Seasonal Problems
1. Influences of wet weather on user attendance rate
2. Influences of insects on user attendance rate
3. Influences of high temperatures on user attendance rate
4. Influences of lightning on operation
5. Influences of wind on operation
6. Provision for user accommodation during unseasonable periods
7. Other

MODULE OF INSTRUCTION

Title - **WINTER RECREATION SITE OPERATION AND MAINTENANCE** Code - 01.0602-03

DESCRIPTION:

The student is exposed to all facets in the operation and maintenance of various kinds of winter recreation sites by visiting area commercial recreation sites, and by critically analyzing on each site a set of factors relating to physical facilities, business administration considerations, and clientele services.

The student is responsible for development of a written and graphic representation of the layout, operation and maintenance of a hypothetical winter recreation enterprise on a specified site.

(Note to instructor - see appendixes #I and #II)

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocation	
	Class	Other
1. Introduction to the study of winter recreation area operation and maintenance	2	0
2. Inventory and analysis of winter recreation site facilities	6	6
3. Planning the layout, operation, and maintenance of a winter recreation site	10	6
	18	12

Revised June, 1974

MODULE OF INSTRUCTION

Title - WINTER RECREATION SITE OPERATION AND MAINTENANCE

Code - 01.0602-03

OBJECTIVES to be obtained: The student will be able to:

1. List, orally or in writing, 9 out of 10 basic types of snow or ice based recreation activities that may be offered at a winter recreation site.
2. List, orally or in writing, 17 out of 19 major categories of concern on the operation of a winter recreation area.
3. Accurately and completely inventory in terms of:
    Physical facilities
    Business administration considerations
    Uses, services and considerations
4. Constructively analyze a completed inventory form in making accurate statements in the form of:
    1. recommendations for change
    2. analysis of job skills required of employees
    3. notation of data representing examples of efficiency for effectiveness on the operation of an enterprise
5. Conduct an effective survey of topographic and commercial factors in the preparation of a feasibility report regarding the development of a winter recreation enterprise on a given site.
6. Develop a site design for a winter recreation enterprise located on the given site
7. Specify all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise regarding its:
    business administration considerations
    physical facilities
    activities as concerns its clientele

Title - **WINTER RECREATION SITE OPERATION AND MAINTENANCE**

OBJECTIVES BY UNIT	CONTENT
1. Introduction to the study of winter recreation area operation and maintenance Objective 1 List, orally or in writing, 9 out of 10 basic types of snow or ice based recreation activities that may be offered at a winter recreation site.	A . Snow or ice based recreation activities . Downhill skiing . " sledding . " tobogganing . Ice skating . Hockey . Curling . Snowmobiling . Snowshoeing . Cross country skiing . Winter camping . Other
Objective 2 List, orally or in writing, 17 out of 19 major categories of concern in the operation of a winter recreation area	B. Physical facilities . Electrical . Plumbing & water supply . Heating . Sewerage . Access . Structures . Power Machinery & motor vehicles . Refuse disposal . Recreational surfaces . Environmental impact Business Administration . Costs of Development and Operation . Labor . Legal Considerations . Promotion . Influences on user volume User Services & Considerations . User Services . User Control . Emergency Provisions . Special seasonal problems
2. Inventory and analysis of winter recreation site facilities Objective 3 Accurately and completely inventory a winter recreation enterprise in terms of; physical facilities, business administration considerations, user services and considerations	A. Inventory, through field tally, of all factors relating to operation of a winter recreation enterprise using inventory form provided.

WINTER RECREATION SITE OPERATION AND MAINTENANCE - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Slides Chalktalk Pictures on bulletin board	A. Participation or discussion re: 10 basic types of snow or ice based recreation activities and contribution of further such activities be expanded. List if preferred by instructor & class. B. Observation of slides and/or pictures of winter recreation activities.	A. Oral or written exam to achieve 90% accuracy
B. Hand out copy of winter recreation site inventory from to each student for home study. Lecture-discussion (Instructor briefly expose students to the scope and importance of each major category to the winter recreation enterprise through discussion and photographic representation).	B. Participation in discussion of scope and importance of each of the major categories of the winter recreation enterprise.	B. Oral or written exam to achieve 17 out of 19 accuracy
A. Field trips-work experience Recreation enterprise operator, lecture-discussion Interviews by students with operator Field tally from data collection Recommend one full class period per enterprise visited Recommend minimum of 3 visits to different winter recreation sites for inventory	A. Students participate in questioning enterprise operator and in observing enterprise facilities in the gathering of field data on the provided inventory form	A. Instructor evaluate's student work re: .Rate of constructive participation in gathering of field data through observation and questioning. .Review of field inventory form for neatness, completeness, and accuracy.

OBJECTIVES BY UNIT	CONTENT
Objective 4 Constructively analyze a completed inventory form in making accurate statements in the form of: . Recommendations for change . Analysis of job skills required of employees . Notation of data representing examples of efficiency and/or effectiveness in the operation of an enterprise.	B. Instructor led analysis of field data inventory forms re: . Recommendations for change within the enterprise to improve effectiveness, efficiency, and/or safety of the operation . Enumeration of job skills needed by the operator and staff members to successfully operate and maintain the particular winter recreation enterprise. . Notation of data representing examples of efficiency and/or effectiveness in the operation.
3. Planning the development, operation, and maintenance of a winter recreation site Objective 5 Conduct an effective survey of topographic and commercial factors in the preparation of a feasibility report re: the development of a winter recreation enterprise on a given site.	A. Survey of and a report on a specific winter recreation enterprise proposal re: . Site Conditions slope aspect elevation soil water vegetation climate access scenic values other . Business Considerations existing area enterprises consumer demand proximity to population centers local zoning ordinances health & safety regulations proximity to supporting services and utility suppliers proximity to supporting scenic or commercial attractions taxes insurance labor market alternative uses of site

EDUCATION

01.0602-03 - Code

WINTER RECREATION SITE OPERATION AND MAINTENANCE - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
B. Lecture-discussion in class (Recommend 3 separate full class sessions devoted to analysis of visited enterprises-one session to follow each visitation.) Field Report	B. Student prepares and submits report based on field data accumulated and analyzed.	B. Instructor evaluates student report re: neatness completeness accuracy constructiveness depth of involvement to instructors standards
A. Lecture and discussion field trip to example site work experience site and business analysis form or guide to be used by students road maps topographic maps (use facilities of local government and utilities for supporting data)	A. Student conducts site evaluation and analyzes business considerations on site, at area courthouse, through interviews with area planning and business officials.	A. Instructor evaluates student report re: accurateness and relevancy of treatment of each factor listed under site conditions and business considerations.

Title - WINTER RECREATION SITE OPERATION AND MAINTENANCE

OBJECTIVES BY UNIT	CONTENT
Objective 6 Develop a site design for a winter recreation enterprise located on the given site	A. Drafting map of site development depicting: Location of all physical facilities Location of all pertinent natural features Location of all pertinent utilities and access routes Location of all pertinent property and use boundaries
Objective 7 Specify all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise re: its physical facilities, business administration and activities as concerns its clientele.	A. Completion of all pertinent data covered on the enterprise inventory form. Student completes the inventory form using his own design and development data, and his learned information about the operation and maintenance of a winter recreation enterprise.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Demonstration by example Lecture discussion Work experience	Student uses his analysis of site conditions and business considerations; and the enterprise inventory form; in mapping the potential development site and plotting all pertinent physical, natural, utility, access, and boundary line features.	Instructor evaluation of student design re: accuracy and neatness of mapping accuracy and neatness of detail plotting accuracy of rationale in overall design of enterprise
A. Demonstration by example Lecture discussion Work experience	Student specifies in writing all pertinent operational and maintenance information required to describe the functioning of the proposed enterprise. Student uses the provided inventory form to accomplish this.	Instructor evaluation of student inventory re: rationale and workability of proposed function of example enterprise

MODULE OF INSTRUCTION

Title - WINTER RECREATION SITE OPERATION AND MAINTENANCE   Code - 01.0602-03

RESOURCE MATERIALS

Bulletins:

1. Agricultural Engineering Rural Resources Development Leaflets, Dept. of Agricultural Engineering, NYS College of Agriculture, Cornell Univ., Ithaca, N. Y. 14850

2. "Budgeting Farm and Ranch Recreation Enterprises"; ESC...559; Federal Extension Service, U. S. Dept. of Agriculture, Washington, D. C. Issued November, 1964.

3. "Conservation Circular - Outdoor Recreation;" A series of short leaflets available from Fernow Hall; N.Y.S. College of Agriculture; Cornell Univ.; Ithaca, N. Y. 14850. (For example Vo. 6., No. 4, October, 1968 entitled "Income Potential From Recreation Enterprise")

4. "The Farmer and the Lawyer", Joseph B. Bugliari, LL.B. Cornell Extension Bulletin 1202, Cooperative Extension, NYS College of Agriculture, Cornell Univ., Ithaca, N. Y. 14850. 12pp.

5. "Federal Assistance in Outdoor Recreation", Dept. of the Interior, Bureau of Outdoor Recreation, Washington, D. C. 20240. 41 pp. (for sale: Supt of Documents, U. S. Government Printing Office, Washington, D. C. Price 20¢)

6. "Forest Recreation for Profit". Agri. Information Bull. No. 265, USDA, USFS, Washington, D. C.

7. "Liability and Insurance Protection in Rural Recreation Enterprises". Ext. Bull. 580; Tourism and Recreation, July 1967; Cooperative Ext. Service, Michigan State Univ., E. Lansing, Michigan.

8. "Outdoor Recreation Space Standards: A Plan" Dept. of the Interior. Bureau of Outdoor Recreation, (for sale: Supt of Documents, Government Printing Office, Washington, D. C. Price 45¢)

9. "Publicity and Advertising", Cooperative Extension, College of Agriculture, Dept of Rural Sociology, Warren Hall, Cornell Univ., Ithaca, N.Y. 14850

10. "Rural Recreation Enterprises for Profit", USDA, Agricultural Information Bull. 44pp. illus. US Govt Printing Office. 20¢ (1963)

11. "Technical Help for Outdoor Recreation - Assistance available from the Soil Conservation Service", USDA, Soil Conservation Service, SCS-CI-16, 4pp. 1969.

APPENDICES

I. The student should be provided with a list of existing modules that provide supporting skills needed in successful employment in winter recreation area development, operation and maintenance. The student should be advised that he should develop with his guidance director a plan for scheduling participation in those modules prior to graduation.

A tentative list of those modules is included below:

01.0206-01	Recordkeeping I for Agricultural Business
-02	Recordkeeping II for Agricultural Business
-03	Analysis of Agricultural Business Records
01.0207-01	Securing Employment and Employee Responsibilities
-02	Personnel Management for Agricultural Business
01.0211-03	Finance and Credit Systems for Agricultural Business
-04	Insurance for Agricultural Businesses
-05	Taxes in Agriculture
-06	Legal Aspects of Agricultural Business
01.0299-01	Personal Financial Planning
01.0301-03	Small Engine Service
-14	Operation of Machinery and Equipment
-25	Light Earth Moving Equipment Maintenance
-27	Tractor and Vehicle Operation
01.0302-01	Planning Agricultural Structures and Service Facilities
-02	Construction and Improvement of Agricultural Structures
-03	Use and Maintenance of Agricultural Structures
01.0307-01	Electrical Fundamentals for Agriculture
01.0504-01	Landscape Design
-02	Constructing Landscape Features
-05	Implementing Landscape Plans
01.0602-01	Campground Development and Management
-02	Summer Recreation Areas - Operational Maintenance
01.0603-01	Soil Science
-02	Soil and Water Management
-03	Soil Erosion Control
-04	Land Measurement
-06	Bulldozer Service and Operation
-07	Backhoe and Loader Service and Operation
-08	Construction of Access Roads
01.0604-01	Conservation Law
01.0605-03	Water and Sewage Systems
01.0699-01	Public Relations
-06	Conservation Structures - Masonry
-07	Conservation Structures - Carpentry

II. Winter Recreation Site Inventory Form

APPENDIX II

Format for Winter Recreation Site Inventory

I. Basic Data

Date ____________________

Business Name ____

Location ____

Proprietor ____

Address ____

Phone No. ____

Recreation Activities and/or Services Offered (list in decreasing order of user-day participation):

____

____

____

____

Season of Operation:
Date employees report to work ____________________
Date open for business ____________________
Date closed to business ____________________
Date employees end work ____________________

User Attendance:
Average length of stay ____________________
Average daily attendance ____________________
Average annual attendance ____________________

II. Physical Facilities

A. Electrical

1. Number of service entrances by size ____________
2. List by major categories all draws on current ____________
   ____
3. How often is wiring checked for safety and serviceability ____________
4. Who installed service and wiring ____________
5. Who installs future electrical facilities ____________
6. Who is responsible for regular electrical maintenance ____________

B. Plumbing and Water Supply

1. List water sources (drilled or dug well, reservoir, etc) ____________
2. List by major categories all draws on water ____________
3. How often is pump and plumbing checked for serviceability ____________
4. Who installed pump and plumbing ____________
5. Who installs future facilities ____________
6. Who is responsible for regular plumbing maintenance ____________
7. How often, how, and by whom, is water tested for purity ____________
8. List water conditioners and treatments used ____________

C. Heating

1. Number of heating units by system type ____________
2. List by major categories all heated special areas ____________
3. How often is heating system(s) checked for safety and serviceability ____________
4. Who installed heating plants and systems ____________
5. Who will do future installations ____________
6. Who is responsible for regular heating plant maintenance ____________
7. List structures by degree and type of insulation ____________
   ____

D. Sewerage

1. Number of separate sewerage disposal systems by type and capacity ____________
2. How often is sewerage disposal system checked for serviceability ____________
3. How is the serviceability of the sewerage disposal system maintained ____________
4. Who installed the sewerage disposal system ____________
5. Who will do future installations ____________
6. Who is responsible for regular sewerage disposal system maintenance ____________

E. Access
1. Specify local public routes of travel influencing user access to site ____________
2. Privately maintained roads and parking areas
    a) miles or feet of roads and size of parking space by surfacing ____________
    b) who constructed roads and parking areas ____________
    c) who will construct future roads and parking areas ____________
    d) employee who is responsible for regular road and parking area maintenance and repair ____________
    e) snow and ice removal equipment and methods used ____________
    f) list traffic control aids used (signing, barriers, speed zoning, etc.) ____________
3. trails (and walkways)
    a) miles of trails by use types ____________
    b) who constructed trails ____________
    c) who maintains trails ____________
    d) what equipment is used in trail maintenance ____________
    e) who will construct any future trails ____________
    f) travel aids provided along trails (rest areas, signing, bridging) ____________

F. Structures
1. List structures by uses ____________
2. Who constructed structures ____________
3. Who will construct future structures ____________
4. Employee who is responsible for maintenance and repair of structures ____________
5. How often are structures inspected to detect disrepair and safety hazards ____________

G. Power Machinery and Motor Vehicles
1. List major pieces of machinery and vehicles by use ____________
2. Who operates machinery and vehicles ____________
3. Who is responsible for their maintenance and repair ____________
4. How often are machinery and vehicles checked and serviced ____________
5. Subject titles of records maintained on machinery and vehicle use and maintenance ____________
6. Who keeps the records ____________
7. Who is responsible for arranging for the supply of fuels and oils ____________

H. Refuse Disposal

1. Are garbage and trash separated ______________________________
2. Method of disposal of garbage ______________________________
3. Method of disposal of trash ______________________________
4. Is refuse in containers secure from animal pests ______________________________
5. Are containers fixed on this spot ______________________________
6. Are containers clean ______________________________
7. Who is responsible for disposal of refuse and litter ______________________________
8. Frequency of and time spent in disposal of refuse and litter ______________________________
9. Are there any special sanitation problems related to the recreation enterprise ______________
10. Annual cost estimate for refuse collection and disposal ______________________________

I. Recreational Surfaces Development and Maintenance

1. Land surface treatments necessary ______________________________
2. Who did the land surface preparation work ______________________________
3. Snow and/or ice surface treatments necessary ______________________________
4. Who maintains snow and/or ice surface ______________________________
5. Equipment used in snow and/or ice surface maintenance ______________________________
6. Employee skills and time re: snow and/or ice surface maintenance ______________________________
7. Snow and/or ice manufacturing and conditioning equipment used ______________________________
8. Skills required to operate snow and ice manufacturing and conditioning equipment used __________

J. Environmental Impact of Operation

1. Influence of local zoning ordinances ______________________________
2. Influence on vegetation ______________________________
3. Influence on wildlife ______________________________
4. Influence on soil and water resources ______________________________
5. Noise problems ______________________________
6. Trespass problems ______________________________
7. Property destruction ______________________________
8. TV and radio transmission interference ______________________________
9. Influence on other commercial operations on same site or in same areas ______________
10. Evidence of visual pollution (scenic) ______________________________

III. Business Administration Considerations
  A. Costs of Development and Operation
    1. Fixed costs
      a) depreciation ____________
      b) insurance ____________
      c) taxes ____________
      d) licenses ____________
      e) interest on loans ____________
      f) other ____________
    2. Variable Costs
      a) supplies ____________
      b) utilities ____________
      c) maintenance ____________
      d) labor ____________
      e) repairs ____________
      f) promotion ____________
      g) expansion ____________
      h) other ____________
    3. Sources of development capital ____________
    4. Initial capital investment ____________
    5. Planning horizon ____________
    6. Annual cash income ____________
    7. Net cash income ____________
    8. Real vs. potential income ____________
    9. Break even estimates ____________
    10. Taxes by type ____________
    11. Insurance by type ____________
    12. Sources of technical and financial assistance
      a) type of assistance ____________
      b) how applied for ____________
      c) conditions of assistance ____________
  B. Labor
    1. Size of work force ____________
    2. Wage scales by position (skill area) ____________
    3. Employee benefits ____________
    4. No of work days per year by position ____________
    5. Employee turnover rate ____________

C. Legal Considerations
1. Land title type and problems
2. Landlord and tenant relations
3. Labor contracts and laws
4. Liability to labor
5. Liability to user
6. Drainage and water rights
7. Right-of-way or easements
8. Fencing of property
9. Posting of property
10. Housing laws
11. Health laws
12. Zoning laws
13. Laws providing technical and financial assistance
14. Tax laws
15. Wildlife laws
16. Summary of degree of reliance upon services of a lawyer

D. Promotion
1. Media used
2. Annual cost
3. Person responsible for promotion

E. Influences on User Volume
1. Natural scenic or other attractions on or near site
2. Proximity to major population centers
3. Other area recreation enterprises in competition or support
4. Unique attractions or services represented by the enterprise

IV. User Services and Considerations

A. User Services
1. Rest room facilities
   a) comment on cleanliness, ventilation, deodorant, lighting; are facilities sufficient to meet volume of user demand
   b) who is responsible for restroom maintenance
   c) frequency and amount of time spent in restroom maintenance
2. Restaurant-snack bar facilities
   a) comment on cleanliness and design of facilities
   b) who is responsible for operation and maintenance of facilities
   c) frequency and amount of time spent in operation and maintenance of facilities
3. Overnight accommodations for guests
   a) comment on cleanliness and design of facilities
   b) who is responsible for operation and maintenance of facilities
   c) frequency and amount of time spent in operation and maintenance of facilities

4. Sport equipment rental, maintenance, and/or repair services
   a) types of services and fees charged
   b) who is responsible for operation and maintenance of service
5. Secondary recreation services
   a) list recreation pursuits offered secondary to the major recreation activities
   b) who is responsible for the operation and maintenance of those secondary recreation pursuits (facilities)
6. User Information Service
   a) what system is used to provide information to users
   b) who is responsible for providing information
7. User privileges received for fees paid
8. Supervised group programs provided by type

B. User Control
1. Describe system for fee collection
2. Specify provision for supervision of users at high risk points on recreation site
3. Vandalism - type - frequency - control - cost
4. Theft - " " " "
5. User caused fire - " " "
6. Presence of attractive nuisances on property
7. Presence of hazardous areas on property

C. Emergency Provisions
1. First aid or medical facilities
   a) type
   b) person(s) responsible and skills required
2. Fire control
   a) system and equipment
   b) person(s) responsible and skills required
3. Search and rescue (including land and water)
   a) system and equipment
   b) person(s) responsible and skills required
4. Communications System
   a) system and equipment
   b) person(s) responsible and skills required

D. Special Seasonal Problems
1. Influences of cold temperatures on user attendance rate
2. Influences of cold temperatures on utilities, vehicles, and other motorized equipment
3. Influences of snow storms on user attendance rate
4. Influences of unseasonably warm temperatures on user attendance rate
5. Influences of poor snow cover
6. Provision for user accommodation during unseasonable periods
7. Other

MODULE OF INSTRUCTION

Title - SOIL SCIENCE Code - 01.0603-01

DESCRIPTION:

The student will examine the common soil classes in the area and the economic importance of each class. Areas that exhibit these common soil classes and soil profiles, will be visited to examine the physical composition of the soil, such as texture, structure, soil life, soil water and the micro-organism present. Methods of soil sampling and testing will be tried, so that students will be able to test for ph in the field and interpret lab test results for phosphorus, potassium and nitrogen. Land will be judged as to its capability for agricultural use and to its potential for various non-agricultural uses.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Soil formation	1	6
2. Physical composition	2	6
3. Soil sampling and testing	1	4
4. Land capability	2	8
	6	24

Revised June 1974

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MODULE OF INSTRUCTION

Title - SOIL SCIENCE Code - 01.0603-01

Objectives to be obtained:

The student will be able to:

1. Recognize and identify under field conditions the ways soil has been formed in the area
2. Identify the physical composition of soils by sight, feel, and by mechanical means
3. Identify the origin of soils by its location and composition
4. Identify top soil, sub soil, bed rock and frangipane by looking at a soil profile and by knowing composition of each layer
5. Test soil for ph with available equipment
6. Sample soils for chemical tests, completely fill in necessary forms and interpret the results of laboratory test
7. Identify the major soil associations in the locality
8. List and identify soils according to land-capability classification and to recommend land use according to the classification
9. Identify land in the locality according to its acceptable use for agriculture and non-agriculture uses re: highways, forests, recreation, urban use, dams, etc.

Code - 01.0603-01

Title - SOIL SCIENCE

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Soil Formation Objective 1 Recognize and identify, under field conditions, how soil has been formed in the area	A. Soils formed by . Physical . Chemical . Mechanical . Biological
Unit 2 - Physical Composition Objective 2 Identify the physical composition of the soil by sight, feel, and by mechanical means. Objective 3 Identify the origin of soil by its location and composition Objective 4 Identify top soil, sub soil, bedrock and frangipane by looking at a soil profile and by knowing composition of each layer	A. Soil composition caused by . Bedrock . Glaciers . Rivers, lakes and oceans B. Soil profile . Top soil . Sub soil . Bedrock . Frangipane C. Soil is composed of . Sand . Silt . Clay
Unit 3 - Soil Testing Objective 5 Test soil for ph with available equipment and interpret results Objective 6 Sample soils for chemical tests, completely fill in necessary forms and interpret the results of laboratory test	A. ph . Definition . Acid, basic, neutral . Testing soil . Interpreting test results B. Chemical testing . Taking samples . Filling out forms (sent with test) . Interpreting test results

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Lecture and film "Understanding Our Earth; Soil" Field trip	Students visit different sites to observe various ways soil is formed. Observe results of wind, water, sun, and glaciers on the formation of soil.	
Field lecture at different sites Study pages 7-12 in Bul. 930 Bul. 267	Students visit same sites as above. Observe action of weathering on bedrock. Observe deposition by glacial action and look for evidence of soil made by sedimentation in former lakes and oceans (fossils)	
	Students visit at least three different soil profiles and observe the characteristics of the different layers. Note differences in color, texture, and structure.	
Field demonstration using various methods to test soil for texture . Feel . Sieve . Sediment (VAS 4030)	At the soil profiles above, students will examine the soil for texture. Use the "finger" method and sieve method.	Oral quiz on 1 and 2. Test especially for student understanding of soils in area: their origin and composition.
Field lecture Field demonstration (Bul. 930, pg 13-14)	Students will test soil for ph at various sites.	Teacher evaluation of testing method
Field demonstration (VAS 4001) Laboratory (Some instructors may desire to test with their own kits but accuracy is a problem)	Students will take samples on a test plot, fill out forms (and/or test in lab) and interpret results.	Teacher observation of sampling and testing methods

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Land Capability for Agriculture and Land Use for Agriculture, etc.	
Objective 7 Identify the major soil associations in the locality	A. Soil series and associations . Characteristics . texture . acidity . rock material . color . drainage
Objective 8 List and identify soils according to land-capability classification and to recommend land use according to the classification	B. Soil classification . Factors including: . soil series . topography . location . Land Classes I - VIII
Objective 9 Identify land in the locality according to its acceptable use for agriculture and non-agriculture uses, re: highways, recreation, urban use, dams, etc.	C. Land use . Definition . Potential uses . History of misuse

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture (Bul. 930) Soil association map Soil survey map of site	Students will study soils in locality at several different sites and will identify different series found. Compare student identification with soil map of same area (available SCS office)	Teacher observation
Field lecture (Bul. 267) (Bul. 249) Student report and map	Student will identify different land classes on a site and will produce a map indicating boundaries of each class found. Accompany report with map containing suggestions as to use of each class on particular site.	Teacher evaluation of map and report
Field trip through areas both urban and rural. Indicate land well used and those areas which are incorrectly used re:houses in flood plain, highways through good farming land, houses built on unstable soil, etc. (Making Rural and Urban Land Use Decisions)	Student observation of land uses. Student plan for a particular locality (2-3 mile radius of school), assume no use is being made of land now. Designate residential, agricultural, manufacturing, recreation, and highway on map of area	Evaluation of map

MODULE OF INSTRUCTION

Title - SOIL SCIENCE   Code - 01.0603-01

RESOURCE MATERIALS

Periodicals -

Maps and local material, County S.C.S. Office
County Soil Conservation Service News, County S.C.S. Office

Bulletins -

Soil Texture, VAS 4030, IMS
Collecting and Preparing Soil Samples for Testing
Soils and Soils Association, Cornell Ext., 930 Chapters
Land Judging, Cornell Ext. 904
Know Your Soil, U.S.D.A. Agricultural Information Bul. 267
How to Take a Soil Sample, National Plant Food Institute, Washington, D.C.
I.M.S. Cornell University, Ithaca, N.Y. (New materials and information)
Land Capability Classification, Ag Handbook, No. 210
What is a Conservation Farm Plan, U.S.D.A. Leaflet 249
Making Rural and Urban Land Use Decisions, available from Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021

Books -

J. H. Stallings, Soil Use and Improvement, Prentice-Hall, Englewood Cliffs, N.J.

Audio-Visual -

I.M.S. Cornell, Stone Hall, Cornell University, Ithaca, New York
N.Y.S. College of Forestry, Syracuse, New York
Film Library, College of Agriculture, Ithaca, New York

Movies -

Understanding Our Earth; Soil

Slides -

Land Judging in New York
Overhead overlays, chart
Models, filmstrips and slides on topic available from Masco, Fort Atkinson, Wisconsin

MODULE OF INSTRUCTION

Title - SOIL AND WATER MANAGEMENT Code - 01.0603-02

DESCRIPTION:

The student will investigate the different soil and water problems found in the area and their ecological implications. Methods of erosion control will be studied in relation to topography, crop rotation, plant needs, and drainage. Areas will be visited that show examples of these soil, drainage and water problems and see how some of these problems have been corrected in cooperation with the county soil conservation service technician. A complete soil and water management plan will be developed, using Land Use Classification maps of the area, erosion information and working with the soil conservation service technician. An estimate of the costs and the equipment needed to do the job will be figured.

DIVISIONS or UNITS of content		Time Allocation	
		Class	Other
1.	Soil and Water problems		4
2.	Methods, Control and Prevention	3	4
3.	Development of Management Plan	4	15
		7	23

Revised June, 1974

MODULE OF INSTRUCTION

Title - SOIL AND WATER MANAGEMENT Code - 01.0603-02

OBJECTIVES to be obtained:

The student will be able to:

1. Identify and list the soil and water problems of a farm.
2. Identify various means by which soil and water resources can be managed.
3. Make recommendations in the field as to the management practices to solve problems of soil and water resources on a farm.
4. Develop a complete written soil and water management plan using a Land Use Classification map of a farm and services available from the conservation agencies in the county. (Use of a plane table for land measurement is recommended.)
5. Layout on a farm all common practices of soil and water management using correct tools and instruments re: transits and/or dumpy levels, hand levels, plane tables, engineer's tape, etc.

Code - 01.0603-02

Title - SOIL AND WATER MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
1. Soil and water problems 1. Identify and list the soil and water problems of a farm.	A. Soil and water problems . Erosion . Drainage . Soil productivity . Stream banks and beds . Flooding
2. Methods to control and prevent soil and water problems 2. Identify various methods by which soil and water resources can be managed.	A. Methods to control soil and water problems: . Crop rotation . Contour farming . Strip cropping . Grass waterways . Pasture management . Woodland management . Small watersheds . Farm ponds . Diversion ditches . Stream bank and bed improvements . Flood control (small scale) . Laws affecting watershed management
3. Make recommendations in the field as to the management practices to solve problems of soil and water resources on a farm.	B. How and where soil and water management practices are to be used.
3. The development and layout of a soil and water management plan 4. Develop a complete written soil and water management plan using a LUC map of a farm and services available from the conservation agencies in the county.	A. Development of a soil and water management plan to include . Map of farm (use plane table, if possible) . Soils and topography . Problems to be solved pertaining to soil and water management practices . Solutions . Costs and cost sharing by government

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field trip Guest lectures - SCS man	Students take field trip to farm already mapped for improvements by SCS. Discuss with SCS agent the soil and water problems of the farm. List the problems found. (Could use school land, if possible.)	Evaluate soil and water problem list handed in by student.
Field trip - visit areas where all or most of the controls are being used. (Movie: Soil and Water Conservation) Discussion of laws pertaining to watershed management (some aspects of water resource development)	Students observe results of various methods of soil and water control. Students should be made aware of actual mechanics of construction of such controls.	
Field study - student participation. A complete study should take 4 - 6 hours	Go to a farm or farms (school land, if possible) where some soil and water controls are needed. Students make recommendations as to how to solve each problem evident on the land.	Teacher observation Oral quiz
Field and classroom report. If possible, the plan should be carried out on the school property or on an adjacent farm. (Leaflet 249)	Students will completely write a soil and water management plan to include a map of the farm showing problem areas, the soil series and topography of the farm, the problems to be solved (cross referenced with map), the solutions to the soil and water management problems and the cost involved in implementing the plan. Students will make use of local contractors in getting estimates on the cost and will discuss with SCS agent cost sharing. This plan can be styled after an SCS farm plan. Students should look over a plan before beginning.	Teacher Evaluation of completed report.

Code - 01.0603-02

Title - SOIL AND WATER MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
5. Layout on a farm all common practices of soil and water management using correct tools and instruments re: transits and/or dumpy levels, hand levels, plane tables, engineer's tape, etc.	Layout various soil and water management practices Note: Forest management practices are best left out because of the skills involved.

01.0603-02 - Code

SOIL AND WATER MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture - how to lay out contours, strip cropping, grass waterways, diversion ditches, stream bed and bank improvement. Other practices will be discussed as to preliminary lay out but should not be included Re: ponds, forest management, flood control. Cornell Bulletin 800 Cornell Bulletin 438	Student crews with proper tools and equipment lay out various soil and water management practices. Example: Diversion Ditch--lay out according to specifications as to width, depth, and slope.	Teacher evaluate methods and results of student teams.

MODULE OF INSTRUCTION

Title - SOIL AND WATER MANAGEMENT   Code - 01.0603-02

RESOURCE MATERIALS

A. Periodicals -

County Soil Conservation Service News
Soil Conservation Magazine

B. Bulletins -

Some Aspects of Water Resources Development - available IMS at Cornell
U.S.D.A. Soil Conservation Service
Measure of our land. Soil Conservation Service U.S.D.A. - PA 128
Know your soil
Soil and water conservation. International Harvestor Co.
How to recognize erosion in the northeast. U.S.D.A. Soil Conservation Service - Bul. No. 27
What is a conservation plan. Bul. No. 249
Small watershed projects in New York State
Farm Ponds in New York State - Ext. Bulletin 949
Contour Strip Cropping - Ext. Bul. 800
Community Watershed Planning - U.S.D.A. Bul. PA 528

C. Books -

J. H. Stallings. Soils - Use and Improvement. Prentice-Hall. Englewood Cliffs, N.J.

Conservation of Natural Resources. Department of Conservation, Cornell University, Ithaca, New York

D. Audio-Visual -

N.Y.S. College of Forestry, Syracuse, New York
I.M.S. - Stone Hall, Cornell University, Ithaca, New York (newest items)
Film Library, N.Y.S. College of Agriculture, Ithaca, New York

Movies:
- Key to Better Soil Management
- This Land is Ours
- Soil and Water Conservation
- Our Land - Its Many Faces
- Myths and the Parallels
- Topsoil
- The Farm
- Adventures of Junior Raindrop

Filmstrip, slides and model

MODULE OF INSTRUCTION

Title - **EROSION CONTROL** Code - 01.0603-03

DESCRIPTION:

The student will study the different types of soil erosion, the causitive agents, and the methods of controlling erosion. Sites will be visited that exhibit active erosion and controlled erosion wherever possible. Where there is an active erosion problem methods of controlling erosion will be developed. One or more of these erosion control practices will be worked on to completion including heavy equipment work, seeding and fertilization.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocation	
	Class	Other
1. Agents of erosion	1	2
2. Factors effecting soil erosion	0	3
3. Erosion control methods	1	3
4. Erosion control layout	1	5
5. Construction of an erosion control device	1	13
	4	26

Revised June, 1974

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MODULE OF INSTRUCTION

Title - EROSION CONTROL Code - 01.0603-03

OBJECTIVES to be obtained:

The student will be able to:

1. Recognize and identify the forms of erosion and state the probable causitive agent.
2. Predict the potential erosion, knowing factors effecting the degree of soil erosion re: soil properties, slope, cover on soil.
3. Identify all of the more common erosion control practices and be able to evaluate the layout and effectiveness of a control practice in use.
4. Stake out the work area at an erosion control site to make optimum use of the equipment and resources made available by the instructor.
5. Set up and level a transit in the field. Direct the rod man through hand signals in laying out grades or contours and setting stakes for area modification.
6. Operate light earth moving equipment to modify the site. Following a pre-identified plan, the student will be able to cut, move, and level earth to grade.
7. Identify, adjust, and use properly the spreading tool for applying lime, fertilizer and seed.
8. Properly plant rooted seedlings according to the erosion control plan. He will employ approved methods of opening the earth, placing of roots, and closing the hole.
9. Apply a cover of straw, hay, or burlaps to protect a seeded area during early stages of plant growth.

Code - 01.0603-03

Title - EROSION CONTROL

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Unit 1. - Agents of erosion Objective #1. Recognize and identify the forms of erosion and state the probable causitive agent.	A. Wind, sheet B. Water . Sheet . Gully and rill . Bank cutting
Unit 2. - Factors effecting soil eroison Objective #2. Predict the potential erosion, knowing factors effecting the degree of soil erosion re: soil properties, slope, cover on soil.	A. Degree of slope and its relation to erosion . Water velocity and its effect . Determining the causes of water speed. B. Soil properties and their effect on erosion . Structure (aggregates) . Texture . Size of aggregates . Water absorption rate C. Soil cover and its effect on erosion . Trees . Grass . Row crops . No cover

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Movie - Waters of Coweeta Conserving our soils today Field trip - observe different types of erosion and agents (USDA Bulletin 260)	Students observe erosion types and the agents which caused it. Students should be aware that although gully erosion is more spectacular it does not cause as much harm as sheet erosion.	Oral quiz - evaluate student as to his knowledge of types of erosion in field.
Field Lecture (double the speed of water.... increase its power by ten fold) (USDA Bulletin 200)	Students to observe the effects of speed of water on its force. A gully is a good example. The lower portion is worn more because of the ever increasing velocity.	Quiz on I and II A
Field Lecture Model - as described right. Use to show the effect soil properties, slope, and cover have on potential erosion. (Kohnkes)	Make two or more wooden boxes 3 feet long by 1 foot by 4 inches deep. At one end of the box a 1 inch V-notch is cut out. Make boxes water tight with a plastic lining or tar. Use various types of soils and soils with various covers to fit the boxes. Vary the degree of slope by lifting one end of boxes. Use two watering cans to sprinkle water on these areas. Catch any run off in glass containers of equal size. Examine runoff water for difference in amount of water and any soil carried with it.	

Code - 01.0603-03

Title - EROSION CONTROL

OBJECTIVES BY UNIT	CONTENT
Unit 3. Erosion control methods Objective #3. Identify all of the more common erosion control practices and be able to evaluate the layout and effectiveness of a control practice in use.	A. Controlling erosion by: . Contour farming . Strip cropping . Diversion ditches . Terracing . Sod water ways . Plantings on steep hills, road cuts, etc. . Establishing sod . Wind breaks . Proper land use
Unit 4. - Erosion control layout Objective #4. Stake out the work area at an erosion control site to make optimum use of the equipment and resources made available by the instructor. Objective #5. Set up and level a transit in the field. Direct the rod man through hand signals in laying out grades or contours and setting stakes for area modification.	A. Possible practices to layout. Chose one or more of the practices as listed in Unit III and layout in preparation for actual construction.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field Lecture Emphasis should be placed on design of each method if applicable.	Student should observe examples of all or most erosion control practices and should be aware of the results. Student should also know the measurements required for each practice.	Quiz on types of practices and design of each.
Field Demonstration Field exercise - on an approved (By SCS) erosion control site. If students haven't had surveying module they should be briefed on setting up and using level for this type of work. (Information sheets #22, 23, 21, 13, 20, 9, 10, and 5) (Cornell Bulletin #808) (Cornell Bulletin #438) (Cornell Bulletin #800) See module .0699-01 Leveling for further explanation	Student crews will layout one or more approved erosion control practices on a farm (or on school land) using all equipment available, re: dumpy levels, tape, hammer, stakes, etc.	Evaluation on degree of accuracy in layout and on correct use of equipment.

Code - 01.0603-03

Title - EROSION CONTROL

OBJECTIVES BY UNIT	CONTENT
Unit 5.-Construction of an erosion control device. Objective #6. Operate light earth moving equipment to modify the site. Following a pre-identified plan, the student will be able to cut, move, and level earth to grade.	A. Construct an erosion control device using available equipment . Bulldozer . Backhoe . Back Blade B. Protection of freshly constructed erosion control device. . Fertilization . Liming . Seeding and/or planting seedlings . Covering seeding
Objective #7. Identify, adjust, and use properly the spreading tool for applying lime, fertilizer and seed.	
Objective #8. Properly plant rooted seedlings according to the erosion control plan. He will employ approved methods of opening the earth, placing of roots, and closing the hole.	
Objective #9. Apply a cover of straw, hay, or burlaps to protect a seeded area during early stages of plant growth.	

01.0603-03 - Code

EROSION CONTROL - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field exercise - The equipment operation will be done only by those students having had modules on the operation of equipment.	Qualified student operators will construct one or more erosion control devices.	Evaluate accuracy, safety and completeness of student work.
Lecture Field exercise	Other student crews will operate transits and will plan for and actively participate in finish work including fertilizing,liming, seeding and/or planting cover.	
	Students will participate in planning kind and amount of fertilizer, amount of lime, kind and amount of grass seed, kind and amount of trees and shrubs. Hand in report.	Evaluate report.

MODULE OF INSTRUCTION

Title - EROSION CONTROL Code - 01.0603-03

RESOURCE MATERIALS

A. **Books** -

Held, R. Burnell, and Clawson, Marion. Soil Conservation in Perspective. Baltimore, John Hopkins Press, 1965 344 pps $7.50

Kohnke, Helmut, & Bertrand, R. Anson Soil Conservation, New York, McGraw-Hill 1959 298 pps $7.95

Foster, Albert B. Approved Practices in Soil Conservation. Interstate Press $4.00
Kohnke, Helmut - Soil Science Simplified - Available NASCO

B. **Bulletins** -

U.S. Dept. of Agriculture - Soil Conservation Service
  Measure of Our Land P.A. 128 22 p
  Soil and Water Conservation Activities for Boy Scouts P.A. 348
  Soil Erosion, The Work of Uncontrolled Water No. 260
  Soil and Water Conservation Needs, A National Inventory No. 971
  Farm Drainage No. 2046
  Know Your Soil No. 267
  Sediment No. 325
  Grass Waterways No. 477

- Reprints from Soil Conservation Magazine
  - Treatment of Critical Erosion Sides
  - Rural Beauty
  - Soil Conservation on New Building Sites

- Soil Survey (by county)
  - U.S. Soil Conservation Service and Cornell

- Information Sheets - Soil Conservation Service
  - Red Fescue No. 22
  - Tall Fescue No. 23
  - Strip Cropping No. 21
  - Windbreaks No. 13
  - Privit Windbreaks No. 8
  - Diversion ditches No. 20
  - Purpleosier Willow No. 9
  - Bayberry No. 10
  - Autumn Olive No. 15

- Cornell Bulletins
  - Control of soil erosion in New York - No. 438
  - Contour Strip Cropping No. 800

MODULE OF INSTRUCTION

Title - EROSION CONTROL Code - 01.0603-03

RESOURCE MATERIALS

B. Bulletins (Con't)

Establishing Streambank Plantings NH No. 20
Seeding and Maintaining Waterways NH No. 24
Contour Farming NH No. 30
Broad Shallow V Type Field ditches NH No. 32

- Soil Survey (by county)
University Agricultural Experiment Station

- Soil and Land Resources - A Home Study Course
Department of Conservation, Cornell University

C. Periodicals -

U.S. Dept. of Agriculture Soil Conservation Magazine. Soil Conservation Service. monthly $2.50 per year

D. Audio-Visuals -

Waters of Coveeta. Syracuse University. College of Forestry. 20 min.
Conserving Out Soil Today. Cornet. Cornell University Film Library. 11 min
World at Your Feet. New York State Conservation Dept. 22 min.

Overlays - Made by instructor showing sheet, gully, and wind erosion at various stages and corrective measures for each type of erosion

Aerial Photographs - Local Soil Conservation Office

Topographic Maps - Local Soil Conservation Office

MODULE OF INSTRUCTION

Title - LAND MEASUREMENT Code - 01.0603-04

DESCRIPTION:

This module is designed to give the student experience in the basic forms of surveying. Emphasis will be placed on the accuracy of measurements. The major portion of the student's time will be spent in the field working with staff compasses and steel tapes, learning the methods of determining right angles and how to connect a series of successive instrument readings in a traverse survey.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Methods of linear measurement	3	5
2. Use of a compass	2	4
3. Traverse Methods	2	14
	7	23

Revised June 1974

MODULE OF INSTRUCTION

Title - LAND MEASUREMENT Code - 01.0603-04

Objectives to be obtained:

The student will be able to:

1. Obtain distance by pacing on a level field within variation of two feet per 100 feet.

2. Obtain distance with a steel tape of sloping terrain (over 2%) using a plumb bob (allowable error - one foot per 500 feet)

3. Establish a predetermined angle of declination on a surveyor's staff compass to within one degree.

4. Follow a straight line of a predetermined tree bearing, with a surveyor's staff compass in a forested area (allowable error-one foot per 300 feet)

5. Explain magnetic declination and its importance to land measurement.

6. Lay out a perpendicular line on the ground, from a base line established at both ends with wooden stakes and tackthat shall not deviate from a tripod level reading of more than one inch per 40 feet of perpendicular line.

7. Determine field area in acres on assignment sheets using a guide set of sample problems and formulas of:
   - rectangle
   - right triangle
   - any triangle
   - trapezoid
   - curved boundary
   - 4 non-parallel sides

   Acceptable performance to be one incorrect determination per four problems.

8. Run an open traverse with the surveyor's staff compass.

9. Close a traverse in the field using a surveyor's staff compass and steel chain and predetermined true bearings and distances. (Traverse is to close within one foot per 500 feet of distance).

AGRICULTURAL

Module LAND MEASUREMENT 01.0603-04

OBJECTIVES BY UNIT	**CONTENT**

Unit #1
1. Methods of linear measurement
Objective 1
Obtain distance by pacing on a level field within variation of two feet per 100 feet
	A. Pacing
	. Standardizing (2 paces/ stride
	. Level versus uneven terrain
	. Ease of application
	. Place of application
	  . reconnaissance
	  . plane table detail
	  . land inventories

Objective 2
Obtain distance with a steel tape of sloping terrain (over 2%) using a plumb bob (allowable error - one foot per 500 feet)
	B. Steeltape
	. Major units of measure
	  . feet & fractions
	  . chains & links
	. Parts and use
	  . thong
	  . trailer
	  . reel
	. Care of tape
	  . cleaning & oiling
	  . reel storage
	  . Dragging

Module LAND MEASUREMENT 01.0603-04

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Demonstration of pace and checking it with steel tape Laboratory exercise: Use groups of 2 or 3 students. Have them pace a measured distance for practice then have them pace a test distance	Students are viewing demonstration and are full participators in the lab. exercise - This activity will determine for each student his measured pace.	How accurately a student uses the pace will be checked several times during the module, by having student pace a measured distance
Demonstration with student help: Show each student a length of the tape for close study of divisions Discuss terms: chain and link usages in surveying and forest mensuration	Students will be involved in practice use of the steel tape in teams of 2 or 3 students each With supervision they will use tape, then clean it and return to to reel.	When each team feels they are ready they will measure a test traverse on sloping terrain and will work at it until they measure within 1 foot over a 500 feet traverse

Module LAND MEASUREMENT

OBJECTIVES BY UNIT	CONTENT
UNIT 1 - Use of a compass Objective 3 Establish a predetermined angle of declination on a surveyor's staff compass to within one degree	A. True North . Agonic line b. Magnetic North . Magnetic attraction C. Arrows on topographic map . True North . Magnetic North - degree deviation
Objective 4 Follow a straight line of a predetermined tree bearing, with a surveyor's staff compass in a forested area (allowable error- one foot per 300 feet)	A. Parts of compass . Compass box . graduated circle . N-S reference points . interchanged E-W points . north arrow . leveling bubble . stop lock . sight vanes . Vertical spindle . Leveling head . Jacob Staff B. Setting off angle of declination C. Local error causing attraction
Objective 5 Explain magnetic declination and its importance to land measurement	A. Quadrants . NE-NW-SE-SW . North and South reference points B. Degrees and minutes C. Writing bearings . Direction . Degrees and minutes

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Use topo map and show degree difference between magnetic and true north - Explain that the disparity varies between geographic locations	Students take point on topographic map and decide where they wish to travel. Attach string to pin at point and extend along a true north direction. Attach another string and extend along a magnetic north direction. Have students calculate distance they would have missed proposed distination if following magnetic north without allowing for the angle of declination.	Oral or written test questions
Discussion and demonstration with no more than 3 students at a time so each can see and understand operation	Students to take turns setting up level on the Jacob staff. Each will complete the activity when the bubble vial shows the correct relationship of bubble to cross marks on vial. Students to be given easterly and westerly declination which they will set off on the compass	will be checked in Unit II Objective 3 (Bearings)
Class discussion and demonstration of the compass Lab exercises using staff compass in the field to follow a straight line of a predetermined true bearing	Student will individually study the compass and then in a team of 2 or 3 students he will follow directions in a lab exercise using the staff compass to follow a true bearing. Student to set up level and set off declination on staff compass	Each team will be checked after they have practiced and they feel they are proficient

MODULE LAND MEASUREMENT

OBJECTIVES BY UNIT	CONTENT
Objective 6 Lay out a perpendicular line on the ground, from a base line established at both ends with wooden stakes and tack that shall not deviate from a tripod level reading of more than one inch per 40 feet of perpendicular line.	A. Crew set-up 1. Head tapeman (chainman) 2. Rear tapeman (chainman) B. Equipment needed and use . Steel tape and reel . Ring and 11 pins . Plumb bob . Range pole . Small stakes C. Procedure in steel taping on land less than 2% slope . Reel storage . Dragging by thong . Function and job assignments of rear and head tapemen . Verbal working instructions . chain . stick (right here) D. Procedure for measuring distances not in even feet or chains E. Procedure in steel taping on land sloping more than 2% . Breaking chain . use of plumb bob . use of range poles

Title - LAND MEASUREMENT Code - 01.0603-04

TEACHING METHOD	ACTIVITIES	EVALUATION
Laboratory Exercise: Problem to be solved Practice in determining distances (traverse) with steel tape on a layed out traverse course One a level traverse and another a sloping traverse	A. Break students into crews of small size preferably two students will measure distance on terrain of less than 2% slope by: • Head tapeman carries ring and pin. He places 1 pin at starting point, carries o end of tape and walks in general line to be measured. • Rear tapeman stands at starting point calls "chain" when the 100 ft. or 1 chain mark comes even with the 1st pin. He directs head tapeman to move right or left until he is on the correct line to be measured. He then holds the 100 ft. or 1 chain mark exactly even with the pin, and calls out mark (stick). • Head tapeman pulls tape tightly and sets pin at o mark and calls "marked". At signal the rear chainman pulls the 1st pin and both men advance and repeat process. • When head tapeman sets the last pin the rear tapeman counts the pins (10) and delivers to the head tapeman who double checks. • Result: since 1 pin was set at starting point 10, tape lengths have been measured (1000 ft. or 10 chains) B. Demonstrate by student participation how distances not ending in even feet or chains is derived by: • Head tapeman places the o mark on the end of the line and the last pin falls between parts of a foot or chain. • Rear tapeman pulls tape back until the lower foot or link mark is even with the pin. • Head tapeman reads tape and adds reading to the number of tape lengths from the starting point. C. Pick a traverse of known distance on sloping terrain of over 2% and have students determine distance by breaking chain when necessary (use of a plumb bob and range poles). Set allowable error and repeat when necessary.	Check each team of students on a pre-measured test traver

OBJECTIVES BY UNIT	CONTENT
Objective 7 Determine field area in acres on assignment sheets using a guide set of sample problems and formulas of: .rectangle .right triangle .any triangle .trapezoid .curved boundary .4 non-parallel sides	A. Erecting a perpendicular with steel tape by 3-4-5 method B. Determination of area in acres with a steel tape . Practical application . use in complete surveys (mapping) . use with planetable . Calculation of taped areas . rectangle . right triangle . any triangle . trapezoid . Curved boundary . 4 non-parallel sides

Title - LAND MEASUREMENT

Code - 01.0603-04

TEACHING METHOD	ACTIVITIES	EVALUATION
Chalk board discussion of 3-4-5 triangles relationship	In the field students erect a perpendicular by the 3-4-5 method and stake it out. The steel tape is used.	Written test of 3-4-5 triangle principles
Field Demonstration with students help of 3-4-5 triangle Chalk board discussion of plane-table area (scale) and calculations of acreages of oddly shaped parcels of land	In lab, hand out formulas and math examples for finding chained areas in acres for the following: (Formulas found in filmstrip) . Rectangle . Right triangle . Any triangle . Trapezoid . Curved boundary . 4 non-parallel sides On a worksheet, following guides, determine acreages on given problems.	Written test on the geometry of these oddly shaped areas.

OBJECTIVES BY UNIT	CONTENT
UNIT 3 - Traverse Methods Objective 8 Run an open traverse with the surveyor's staff compass	A. Definition of traverse B. Simple traverse note form . Station . Object (adjacent station) . Distance . True bearing C. Combination of steel taping and compass readings D. Crew make-up and responsibility . Instrument man . Recorder . Head chainman . Rear chainman
Objective 9 Close a traverse in the field using a surveyor's staff compass and steel chain and predetermined true bearings and distances. (Traverse is to close within one foot per 500 feet of distance)	A. Definition of closed traverse B, C, D. Same as Objective #6.

Title _ LAND MEASUREMENT Code- 01.0603-04

TEACHING METHOD	ACTIVITIES	EVALUATION
Chalk board discussion of meaning of traverse including distances (tape or pace) and angles at corners (compass readings)	Students to be put into crews of 4 or 5 (5th man can pace adjoining properties and sketch detail). Students will continue at a predetermined bearing completing sufficient stations for all members to acquire experience in all 4 (5) job procedures. Students will use the staff compass to run and measure straight lines at prescribed bearings.	Written test involving a closed traverse to scale. Problem: to determine angles and distances by use of scale and protractor.
Chalk board discussion as above	Same as Objective #6 Except Students get a handout with a map of a closed traverse complete with distances and bearings. Crews will run lines between stations and attempt to close the traverse. Student will run a series of open traverses of different true bearings to a closed traverse conclusion.	Above test will suffice for open traverse

MODULE OF INSTRUCTION

Title - LAND MEASUREMENT   Code - 01.0603-04

RESOURCE MATERIALS

A. BOOKS

Short Course in Surveying - Davis & Kelly - McGraw-Hill.

B. AUDIOVISUALS

Filmstrip

Using Steel Tape - Agr. Eng. Dept., University of Illinois,
Voc. Agr. Service, 434 Mumford Hall,
Urbana, Illinois

MODULE OF INSTRUCTION

Title - ADVANCED SURVEYING

Code - 01.0603-05

DESCRIPTION:

The student will study and apply techniques of transit survey with tape or stadia, and field notes, in closing a simple traverse.

He will conduct a simple plane table survey by intersection and reduce field notes for plotting a map.

A finished area map will be drafted utilizing lettering sets, pantographs, dot grids and other drafting items.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Use of the transit and allied equipment in traversing	1	5
2. Traverse survey	5	5
3. Plane table survey by intersection		8
4. Mapping	6	
	12	18

Revised June, 1974

MODULE OF INSTRUCTION

Title - ADVANCED SURVEYING Code - 01.0603-05

OBJECTIVES to be obtained:

The student will be able to:

1. Safely and accurately set up a transit over a hub, readying it for field use, to instructor's standards
2. Safely and accurately utilize specific measuring devices on the transit in conjunction with targets, stadia rod and tape to obtain samples of data commonly needed in traversing to instructor's standards
3. Safely and accurately shoot stadia using proper note form attaining an allowable error of within 1/1000 or 0.1 ft. in 100 ft. of distance; reducing field data to horizontal distances in the office
4. Survey a closed traverse (or an open traverse with shots returning to point of origin) using transit with tape or stadia rod to an accuracy of within 1/1000
5. Reduce obtained field traverse data and plot it to a degree of accuracy and neatness sufficient to reveal, through observation, the ratio of error attained in traversing
6. Establish (in the field) a base line with the plane table (traverse board) set up at either end and oriented for field mapping to within one degree of error and no error in vial bubble
7. Draw a map using a plane table (traverse board) that plots interior detail by radiation or intersection within an average error of one scaled foot per five plotted structures when compared to "master" overlay
8. Utilizing drafting instruments, ink and described techniques to prepare a finished map that demonstrates map parts, mechanical lettering, line differentiation, and neatness to instructor's standards

Code - 01.0603-05

Title - ADVANCED SURVEYING

A G R I C U L T U R A L

OBJECTIVES BY UNIT	CONTENT
Unit 1. Use of the transit and allied equipment in traversing	
1. The student will be able to safely and accurately set up a transit over a hub, readying it for field use to instructor's standards	A. Safe and effective handling of instrument and equipment . Carrying in field . Transit with tripod . tripod legs wing nuts loose . gun turned up and loosely secured in position . compass needle secured . plumb bob secure . carry on your down hill side over shoulder or with both arms in front with transit up front . Stadia rod . lay down on flat ground surface only . do not carry rod extended . Setup . Transit with tripod . centering plumb bob over hub . leveling instrument . proper adjustments to transit and tripod when carrying between stations . Plumb bob with or without cord target . centering plumb bob over hub . stabilizing . use with tripod . Stadia rod . Correct extension and securing of rod extension . Correct holding of rod for reading . plumbing . rocking . correct facing orientation . use of rod level . use of rod vernier . effective interpretation of hand and voice commands

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Instructor Lecture-Demonstration Student work experience Coordinate student work experience in instrument carrying and setup with work experience in objective B following Work experience in crews of two to three men (Reference: (1: ch. 6, 19)	A. Students observe demonstrations of how to safely carry instruments in the field and how to set them up correctly. Students work in teams (i.e. one handles transit while other handles allied instrument)	Instructor evaluates by observation of students as they carry and set up instruments. Instructor may wish to evaluate student ability by means of a field examination.

OBJECTIVES BY UNIT	CONTENT
Unit 1 (cont.) 2. The student will be able to safely and accurately utilize specific measuring devices on the transit in conjunction with targets, stadia rod, and tape to obtain samples of data commonly needed in traversing to instructor's standards	B. Reading measuring devices on the transit . Horizontal measurements • compass bearings (forward and back) • vertical hair in scope in establishing line • azimuths (internal and deflection angles) with vernier reading (repetition to check and/or to increase precision) . Vertical measurements • leveling and securing of gun • vertical circle reading with gun level • center horizontal hair in scope in establishing gun angle • reading vernier . Prolonging a straight line • prolonging • extending from a backsite . Distance • maintaining taping crew on line • by stadia • reading intercept • noting and use of constant factor • verbal and hand signals to rod man • measuring height of instrument and proper shooting of vertical angle stadia . Field note taking • Forms of notes • variance • interpretation • Notebook . supplemental sketches . proper procedure . importance of accuracy
3. The student will be able to safely and accurately shoot stadia using proper note form attaining an allowable error of within 1/1000 or 0.1 ft in 100 ft of distance; reducing field data to horizontal distances in the office	C. Shooting and reducing stadia . Stadia Principle • geometric • constant factor . Reading the rod • horizontal readings • sloping readings . Linear measurement • note form for horizontal and sloping readings • running lines . Sources of error . Reducing instrument reading to distance (horizontal) • horizontal readings • sloping readings

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
B. Instructor Lecture-Demonstration Student work experience Coordinate with objective A preceding Ref: (1: ch. 6,7)	B. Students observe demonstrations of how to accurately read verniers, compass, rod graduations; how to use vertical, horizontal, and stadia hairs; and the focusing of cross hairs and gun Students in crews of 2 to 3 men rotate on instruments and obtain measurement readings to be checked against master sheet held by instructor	B. Evaluation by observation of student efficiency and accuracy Checking student measurements against pre-measurement control data Instructor may evaluate student understanding of proper note keeping technique by testing for proper placement of data on form, neatness, completeness, etc.
C. Instructor orients students to a short exercise in stadia traversing (a section of highway, trail, property boundary, etc.) using stations Student work experience Instructor provides assistance to students in field. (Ref: (1: 13)	C. Students, in crews of 2 to 3 men carry out a stadia survey of a traverse requiring approximately 4 setups with transit. Students should preferably be required by traversed terrain to make at least one sloping stadia shot Students maintain neat, complete, and accurate field notes on supportive survey information, angles turned, bearings, and stadia data. Students to reduce field data to provide horizontal distances on field note form.	C. Instructor observes student efficiency and accuracy of work in the field. Instructor evaluates field note form and checks distances and bearings and/or angles against his control data

Code - 01.0603-05

Title - **ADVANCED SURVEYING**

OBJECTIVES BY UNIT	CONTENT
Unit 2. Traverse Survey	

4. The student will be able to survey a closed traverse (or an open traverse with shots returning to point of origin) using transit with tape or stadia rod to an accuracy of within 1/1000	A. Traversing
	. Direction measurement (selection of method)
	  . bearings
	    . as primary measurement
	    . as check measurement
	  . by internal angles
	  . by deflection angles
	  . by azimuths
	. Linear measurement (selection of method)
	  . by tape
	  . by stadia

5. The student will be able to reduce obtained field traverse data and plot it to a degree of accuracy and neatness sufficient to reveal, through observation, the ratio of error attained in traversing	B. . Reducing and correcting field data
	  . obtaining horizontal distances
	  . balancing angles
	. Plotting
	  . north orientation
	  . protractor use
	  . engineer's scale
	  . drafting board and T square
	  . ratio of error
	. Relativity to map preparation

01.0603-05 - Code

ADVANCED SURVEYING - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Chalk talk Field lab work experience Field assistance to students Ref. (1: ch. 8)	Students obtain all measurements required for a closed traverse survey	Evaluate by field observation of student work rate and correct use of instruments. Check angles and distances in field to catch errors requiring remeasurement
B. Chalk talk Demonstration (possible use of calculator) Form handout for obtaining horizontal distances Form handout for balancing angles Ref. (1: ch 8, 4)	Students reduce their field date for plotting and to check for possible errors in field survey	Evaluate reduced data for correctness, completeness and errors revealed in field work Evaluate plotting work for accuracy, neatness and completeness

Code - 01.0603-05

Title - ADVANCED SURVEYING

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Unit 3 . Plane Table Survey by Intersection	
6. The student will be able to establish (in the field) a base line with the plane table (traverse board) set up at either end and oriented for field mapping to within one degree of error and no error in vial bubble	A. Parts and Use . Alidade and scope . Table and level . Setting up B. Variations . Traverse board . Sighting devices C. Application . Accuracy . Area mapping . Traverse interior detail . Topographic use . Land use planning
7. The student will be able to draw a map using a plane table that plots interior detail by radiation or intersection within an average error of one scaled foot per 5 plotted structures when compared to "master" overlay	D. Advantages and Disadvantages . Field notes . Omissions . Speed . Climate . Area calculation E. various Methods . Intersection . Radiation . Traversing . Comparisons of 3 mentioned F. Mapping by Intersection . Choice of scale . Measuring base line . Locating detail . Plotting . Sources of error • table position • sighting and adjustment • recording • measurement of lines

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk talk Demonstration Lab exercise Ref. (1: ch. 13)	If possible, students plane table survey within area of closed traverse. Instructor use own discretion in specifying amount and kind of objects, structures, etc. to be plotted on the plane table map. Students learn through work experience: To develop a map of a small area complete with interior detail To correlate function of plane table by itself and with other types of surveys To properly establish base line, obtain linear measurement and secure required data	Evaluation by field observation of student work Evaluation of field drawn plane table map re completeness, accuracy (one foot per 5 objects plotted) in comparison with instructor's "master" overlay, and neatness

Code - 01.0603-05

Title - ADVANCED SURVEYING

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Unit 4. Mapping	
8. The student will be able to utilize drafting instruments, ink, and described techniques to prepare a finished map that demonstrates map parts, mechanical lettering, line differentiation, and neatness to instructor's standards	A. Use of Mapping Instruments . Lettering . Sets . India ink . Styles . Pantograph . Enlargement . Reduction . Duplication . Acreage Determination . Dot grid . Planimeter . Summation of squares . Light Table . Use and application B. Map Drafting . Drawing instruments . Drawing board . T square . Triangles . Curves . Pencils . Ruling pens . Paper . Map Requirements . Title . Scale . Meridian . true . magnetic • Declination . Name and date . Border . Legend . Miscellaneous . Inking . Line width . Ruling . Shading . Colored inks . Proportion . Cleaning

EDUCATION

01.0603-05 - Code

ADVANCED SURVEYING - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk talk Demonstration Lab exercise (continuation of work experience in transit and plane table surveying) Ref. (1: Ch. 8)	Students in lab utilize data from transit survey of traverse and detail from plane table survey to produce a finished map. Each student must draw his own map. Student obtains working experience in lettering in lead and ink, light table use, use of pantograph (in enlarging map to instructor's specifications), use of area determination tools and/or formulae. Students see the end result of a transit survey with plane table detail. Students gain working experience with variety of map drafting equipment.	Instructor evaluate student's finished map in terms of: . Neatness . Completeness . Accuracy of line and detail placement . linear . angle . Scale . Correct acreage determination . Other instructor directed terms of evaluation

MODULE OF INSTRUCTION

Title - ADVANCED SURVEYING Code - 01.0603-05

RESOURCE MATERIALS

Books

1. Surveying, Harry and F. H. Moffitt, International Textbook Company, Scranton, Pennsylvania, 5th Ed., Copyright 1965, 754 pp. illus.
2. Short Course in Surveying, Daris and Kelly, McGraw-Hill
3. Plane Surveying, Tracy, John Wiley & Sons

MODULE OF INSTRUCTION

Title - BULLDOZER SERVICE AND OPERATION Code - 01.0603-06

DESCRIPTION:

This module should consider the safe and effective operation of a track vehicle and the operation of the blade and accessory equipment. Students will be responsible for the complete daily maintenance and long range maintenance of the machines. Experience will be gained in loading and unloading this equipment. The majority of the class time will be spent learning the operation of the blade control in cutting, leveling and other more common operations.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Safety in bulldozer operation and maintenance	1	1
2. Maintenance of bulldozer, daily, weekly, and long range		5
3. Operation of the blade		14
4. Operation of track vehicle		3
5. Operation of accessory equipment i.e. winch, ripper, etc.		4
6. Loading and unloading the machine		2
	1	29

Revised June, 1974

MODULE OF INSTRUCTION

Title - BULLDOZER SERVICE AND OPERATION Code - 01.0603-06

OBJECTIVES to be obtained:

The student will be able to:

1. Practice the safety rules of operating and maintaining a bulldozer.

2. Perform the necessary maintenance checks and operations on a bulldozer.

3. Operate a track vehicle

4. Operate a bulldozer blade (both straight and power angle - tilt)

5. Operate the accessory equipment on a bulldozer
   a) winch
   b) ripper
   c) other attached equipment

6. Safety load, secure, transport to job site, and unload equipment.

Module BULLDOZER SERVICE AND OPERATION 01.0603-06

OBJECTIVES BY UNIT	CONTENT
UNIT 1 Safety in Bulldozer operation and maintenance Objective 1 Recognize the safety rules of operating and maintaining a bulldozer	A. Maintenance safety including: . Safety rules before maintenance . Filling fuel tank safety . Lubricating safety . Cleaning vehicle B. Operation safety including: . Clothing to wear . Operation limits of vehicle . Seat belts (if bulldozer has canopy) . Working around trees and brush . Getting out of mud
UNIT 2 Maintenance of the bulldozer daily, weekly, and long range Objective 1 To be able to perform daily, weekly, and long range maintenance on bulldozer	A. Items of maintenance: . Refueling . Lubrication . Oil level and pressure . Coolant . Battery . Filters, oil, air, hydraulic systems . Generator operators . Ignition . Hydraulic systems, operation and leaks . Operation of controls . Loose or lost parts, damage . Track maintenance and cleaning . Cold weather storage

EDUCATION

Module BULLDOZER SERVICE AND OPERATION 01.0603-06

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
UNIT 1		
Teacher demonstration of maintenance safety rules to follow	Student Observation	Students to make lists of all safety rules
Teacher demonstration of operation safety rules	Student Observation	Oral test on why rules are needed
UNIT 2 A. Explain and demonstrate use of equipment manual	A. Students to learn names and positions of all parts from overheads, the manual, and the machine	A. Tests - written and oral on nomenclature
B. Use handouts and overheads made from manual of parts and systems.		B. Written tests on intervals of maintenance
C. Teacher demonstration on the machine		
D. Student practice (2 each day) on maintenance (throughout module)	B. Students perform service in rotation, daily and as required	C. Checklist of field performance as to: . Safety of maintenance . Efficiency of maintenance . Student completion of the checks according to instructor's standards.

AGRICULTURAL

Module BULLDOZER SERVICE AND OPERATION 01.0603-06

OBJECTIVES BY UNIT	CONTENT
UNIT 3 Operation of track vehicle Objective 1 To perform basic operations of starting and stopping vehicle and mounting and dismounting Objective 2 To perform basic operations of use of transmission (automatic or manual) steering and braking	A. Steps in Operating vehicle: . Mounting vehicle . Starting vehicle . Checking gauges . Shifting (manual or automatic) . Steering . Braking . Placing vehicle in neutral and shutting off vehicle . Dismounting safely

UNIT 4
Operation of the blade
Objective 2
To perform operation of the blade safely and efficiently under different situations
	A.
	Items in operation
	. Operation of controls for straight and/or augulated blade
	. Operating blade in various situations
	  . cutting
	  . filling
	  . back filling
	  . grading
	  . moving material
	  . grubbing trees and brush
	  . In all cases demonstrate use of all power blades if applicable
	. Safe operation
	. Speed of operation

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
UNIT 3		
A. Explain and demonstrate mounting, starting, shifting, braking, stopping and dismounting of vehicle	Student observation of demonstration Student practice under direct supervision - other students observe	Student is evaluated on a checklist for: . Safety of operation . Following given instructions . Cooperation with student supervision . Speed of operation
B. Each student practice operation under direct supervision of instructor	Student practice with another student as supervisor	
. Student with student supervision practices operation of vehicle	Remaining students discuss operation with instructor while observing other students performing	Oral test on operation safety
UNIT 4		
Demonstrate operation of hydraulic controls	Student observation	
Demonstrate operation of blade for different situations including use of all power tilt if applicable	Student observation	
Practice by student under direct supervision of teacher		Student is evaluated on a checklist for: . Safety of tasks performed . Following given instructions . Speed and efficiency of operation . Cooperation with partner
Practice by student using another student as supervisor	Student practice in 2 man teams one operating, one directing under field conditions if possible. Remaining students critizing operators as to performance	

AGRICULTURAL

Module BULLDOZER SERVICE AND OPERATION 01.0603-06

OBJECTIVES BY UNIT	CONTENT
UNIT 5 Operation of accessory equipment i.e. winch, ripper Objective 1 To operate safely and efficiently accessory equipment a bulldozer may include	A. Items of operation . Operation of winch . Operation of ripper . Operation of PTO Driven equipment, ie. brush hog . Operation of . Safety involved
UNIT 6 Loading and Unloading the machine Objective 1 Safely load, secure, transport to job site and unload equipment	A. Steps in loading and unloading . Positioning and preparing truck and/or trailor for safety and ease of loading . Moving bulldozer on to the bed of the carrier includes winch, gears, speed, braking and position on carriers . Safety in securing the unit to the carrier . Preparation of carrier for highway . Proper and safe unloading of bulldozer

EDUCATION

Module BULLDOZER SERVICE AND OPERATION 01.0603-06

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Demonstration of operation of various accessory equipment by instructor	Student observation	
Student practice with direct supervision by instructor	Student practice under field conditions Remaining students observe and critique operators	Student is evaluated on a checklist for: . Safety of tasks performed . Following given instructions . Speed and efficiency of operation
A. Teacher demonstration on loading and unloading dozer	Student observation	
B. Student practice by student under direct supervision of instructor	Student practice under field conditions	Student is evaluated on a checklist for: . Safety of tasks performed . Following given instructions . Speed and efficiency of operation

MODULE OF INSTRUCTION

Title - BULLDOZER SERVICE AND OPERATION Code - 01.0603-06

RESOURCE MATERIALS

A. Bulletins -

1. Crawler Tractor Safety Manual $1.00
   Construction Industry Manufacturers Association
   111 E. Wisconsin Ave., Milwaukee, Wisconsin 53202

   Also available IMS at Cornell University

2. Construction Safety Site Clearing, Superintendent of Documents, Department of Labor, Bulletin #302 25¢

B. Audiovisuals -

Modern Skidding - Film Library, N.Y.S. Forestry College, Syracuse, N.Y.
20 minute Free

Basic Blading - Caterpiller Tractor Co. Area Dealer or Syracuse
The Gamblers - Supply Co., 294 Ainsley Drive, Syracuse, New York

MODULE OF INSTRUCTION

Title - OPERATION OF BACKHOE AND LOADER

Code - 01.0603-07

DESCRIPTION:

The student will have practice in the safe operation of the Backhoe and Front End Loader. They will perform daily and periodic, checks, service, and cleaning of the unit. Students will have experience in loading and unloading the machine.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Loading and unloading		4
2. Daily and weekly maintenance	1	4
3. Operation of the backhoe		13
4. Operation of the front end bucket loader		6
5. Storage of machine	1	1
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - OPERATION OF BACKHOE AND LOADER

Code - 01.0603-07

OBJECTIVES to be obtained:

The student will be able to:

1. Load and unload the machine for highway transportation.
2. Perform daily and periodic cleaning, maintenance checks and operations.
3. Operate the backhoe with accuracy and efficiency of time and a maximum of safety to himself and fellow washers.
4. Operate the front end bucket loader, to quickly and neatly move material.
5. Properly store unit in the field as for overnight or for longer periods of time in a storage area.

NOTE: See modules under Agricultural Mechanics for maintenance and repair.

Title - OPERATION OF BACKHOE AND LOADER

OBJECTIVES BY UNIT	CONTENT
UNIT 1 Loading and Unloading Objective #1. To be able to safely load the backhoe unit on a tilt-bed truck or trailer, for highway transporting. To properly secure the unit. All to meet highway safety regulations, and to the satisfaction of the instructor.	A. Steps in Loading: · Preparation of the truck or trailer for the unit, positioning, at proper levels and clearances, for safety and ease. · Positioning truck and trailer bed, winch, cable and chains. · Moving the unit on to the bed of the carrier: includes use of winch, gears, engine speed, winch speed, braking and position on the carrier. · Safety in securing of the unit to the carrier, proper chains, fastened correctly, tighteners, and winch. · Preparation of the carrier for the highway, return of the bed to highway travel position, stowage of ramps, disengaging the winch. · Final check for safety, chains and tools, making sure all is secure before moving out. B. Steps in unloading: · This would be the same as loading except for order of performance.

01. 0603-07 - Code

OPERATION OF BACKHOE AND LOADER - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Teacher demonstration to the group, using two students to perform most operations.	A. Student observation, two students participating.	none
B. Practice, under close supervision, with students as a team, by two's, doing the loading.	B. Student practice, where each with a team-mate performs the loading. Practice on level sites, then under field conditions.	A. Student is evaluated on a check sheet for: . safety of tasks-performed . following given instructions . speed of operation . cooperation with partner . site selection . performance of final check before moving.
C. Practice, by two students on a rooster rotation, when the unit is moved to or from a work area during school time.		

Module OPERATION OF BACKHOE AND LOADER

OBJECTIVES BY UNIT	CONTENT
UNIT 2 Daily and weekly maintenance Objective #2 To be able to perform safely, maintenance checks as required, daily, or periodically, under storage and field conditions. To be made according to manufacturer's manual instructions.	Items of Maintenance: . refueling . lubrication . oil level and pressure . coolant . battery . tire pressures .filters, air, oil, hydraulic , systems . generator operation . ignition . hydraulic systems , operation & leaks . operation of controls . loose or lost parts, damage.

EDUCATION

Module OPERATION OF BACKHOE AND LOADER 01.0603-07

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
A. Explain and demonstrate use of the equipment manual. (classroom)	Student required to learn names of parts, from overheads, memos, the manual, and the machine.	A. Tests, written and/or on diagrams of nomenclature.
B. Use overheads of parts and systems, made from the manual. (classroom)		B . Tests written as to knowledge of time intervals of required services.
C. Handouts to students of memos made from manual of parts, systems and maintenance instructions.		
D. Teacher demonstration on the machine, with the aid of one or two selected students .	Student performs service in rotation, daily and as required.	Make a check-list of field performance as to:
E. Practice, in actual checks, daily, by the first two operators and upon assignment when necessary.	First two students perform required operations daily or as required.	A. Safety of maintenance B. Speed at which maintenance is performed C. Students completion, of the checks according to his instructions.

Module OPERATION OF BACKHOE AND LOADER

OBJECTIVES BY UNIT	CONTENT
UNIT 3 Operation of the Backhoe Objective # 3 To be able to move earth from a ditch, safely, Specifications that accuracy of 2" vertically and horizontally be attained. To be able to handle controls so that operation is smooth and continuous, without lost time or motion. As determined by the instructor.	ITEMS in Operating: . Positioning of the tractor, and setting up the unit for backhoe operation. . Use of controls, hydraulic and mechanical. . Proper angles of, total machine, bucket, boom and swing. . Limitations of the unit. . Safe operation.

Module OPERATION OF BACKHOE AND LOADER

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
A. Overhead projections of proper angles, from manual. (classroom)	A . Student study, observation and discussion.	A . Written tests of proper operation, and angles of operation.
B. Handouts, memos, from manual illustrations.	B . Student study	B. Teacher check list of: . safety of operation . student supervision . student operation . Co-operation of students . quality of work . quantity of work completed
C. Teacher demonstration in the field to the group.	C . Student observation	
D. Student's first operation with the teacher on the unit with the student.	D Student operation, with very close supervision.	
E. Student operation with a student supervisor.	E. Student operation, in ten or fifteen minute periods. A student supervisors the operator before his turn to operate the machine each time. The supervisor is positioned on the ground, in sight of, but safely beyond the machine. He aids in the operation and safety of the job, by hand signals to the operator.	
F. Teacher is constantly observing and making suggestions	F. Both operator and supervisor are responsible for constant safety.	
G . Student job supervisor for the day.	G. Student Job Supervisor is responsible for timing, having the right student on the job at the proper time, and for the proper time. He is also responsible to the teacher to see that the job is being done according to instructions.	

Code 01.0603-07

Title - OPERATION OF BACKHOE AND LOADER

OBJECTIVES BY UNIT	CONTENT
UNIT 4	
Operation of front end BUCKET LOADER Objective #4 To be able to operate the unit with the bucket loader, and to move material. . To load material on a truck . To move and pile material . To scrape and level material as instructed by, and to the satisfaction of the instructor	Items in Operation: . Preparation of the unit for using the bucket loader . Use of controls Hydraulic and mechanical . Proper angles and turns, of machine in position to be worked upon and to place of deposition. . Operating positions of the bucket for digging, carrying and unloading. . Proper operating speeds . Limitations of the unit . Safety precautions.

EDUCATION

01.0603-07 - Code

OPERATION OF BACKHOE AND LOADER - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Overhead projections of turning, loading and unloading patterns. (from manual)	A. Student observation, study and discussion.	A. Written tests of proper operation patterns, controls, angles and safety
B. Overhead projections of proper bucket angles and positions		B. Field operation check sheet. . Safety of operation . Student supervision . Cooperation of students assigned to the job . Quality of the work . Quantity of work
C. Student handouts of the same material.		
D. Demonstration in the field by the teacher to the entire class.	B. Student observation	
	C. Student operation, under very close supervision.	
E. Student operation, first time with the teacher on the unit with the student.	D. Student operation under student supervisor, each student on machine for ten or fifteen minutes supervised by the next operator. Supervisor is on the ground at a safe distance, using hand signals to communicate with the operator.	
F. Student operation, with student supervisor.	E. Both operator and supervisor are responsible for safety and performance.	

Module OPERATION OF BACKHOE AND LOADER

OBJECTIVES BY UNIT	CONTENT
UNIT 5 Storage of Machine Objective #6 • To be able to prepare machine for storage overnight in the field . • To prepare the machine for storage in the facilities of the school. • To the requirements of the school and the teacher.	A. Items to be checked for field storage: . Ignition off, key removed . All hydraulic operated buckets and pads lowered to ground. . parked on a level area, out of the way of traffic . If possible cover operators,area, and engine. . Give special consideratios for: freezing, rain, hot weather, muddy conditions, flood. Use hard dry surfaces, planks, small logs, or stone. B. Items to be checked for non-working periods in Area. . Cleaning, washing and/or steam cleaning. . Positioning for safety. . Service checks . Protection of the covers, locked storage.

EDUCATION

Module OPERATION OF BACKHOE AND LOADER

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
A. Use service manual recommendations	A. study recommendations	A. Use written test of storage, safety and maintenance procedures.
B. Give a memo of recommendations to each student		
C. Teacher demonstration in the field and in the storage area.	B . observe demonstration	B. Use a check sheet on students' performance of:
D. The last team of students performs the storage procedures for that day as required by the instructor.	C . perform daily storage operations required in the field. D . perform storage operations when unit is to be stored in area	. safety . locking . field site selection . machine protection . machine cleaning

OPERATION OF BACKHOE AND LOADER Module

Agr. Conservation Area

RESOURCE MATERIALS

01.0603-07 Code

A. Books -

1, Teacher

1. Operator's Manual for the equipment owned.

2. Backhoe Operator's Manual - Ford Motor Co.

Suggested; (not checked)

3. Equipment operator 3&2 Navy Training Course
NAUPERS 10640-E Bureau of Naval Personnel
(nearest training station)

4. Equipment operators training schools.

2. Student

1. Same as above.

2. Mimeographed handouts made from important parts of manuals.

B. Bulletins -

RESOURCE MATERIALS (cont'd)

C. Periodicals -

D. Audiovisuals -

Overhead diagrams made from drawings in the operators manual by the teacher of the owned unit.

Overheads made from other reference pages.

Suggested : (none are specified)

Up to date movie on safety

MODULE OF INSTRUCTION

Title - CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS Code - 01.0603-08

DESCRIPTION:

Access roads are a vital link from the macadam highway into the center of timber stands and wilderness areas. They are usually constructed of materials found in the area of the road and are constructed only for limited access to the area. Students will lay out sites for an access road taking into consideration the slope of the terrain, type of soil the road will pass through, availability of road construction materials, ditching, and drainage patterns. Access roads will be constructed to meet approved student designed specifications.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Purpose and Objectives in Construction of Access Roads		2
2. Planning		2
3. Location and Survey		10
4. Construction		14
5. Maintenance	2	
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS **Code** - 01.0603-08

OBJECTIVES to be obtained:

The student will be able to:

1. Gain skills and attitudes needed for successful employment on planning, design construction, and maintenance phases of access roads in forest areas.
2. Identify and use basic premises upon which access road construction and maintenance are based.
3. Make notes on the different kinds of access roads that can be built.
4. Identify and use the natural factors that influence how, where and what kind of access road should be built.
5. Identify the reasons why an access road should be carefully located before construction begins.
6. Correctly discern drainage and contour features on aerial photos and USGS topographic maps when roughly locating a planned access road.
7. Choose and mark on an aerial photo or USGA topographic map acceptable, preferred and alternate routes between two known points.
8. Locate on the ground the route plotted on the photo or topographic map and will blaze or flag the proposed route.
9. Map the flagged route line giving profile levels, distances, bearings, cross sections at grade stakes, ground conditions and will logically locate the first center line in a manner that facilitates ease of construction, use and maintenance.
10. Calculate cut and fill data from side shots at grade stakes.
11. Place line stakes in the ground using plotted center line as guide.
12. Clear right of way between line stakes.
13. Set center line stakes every 100 feet and set out ditch line stakes to denote tops of cuts and toes of fills.
14. List the manpower and machinery necessary to construct the access road.
15. Transfer cut and fill data at 100 foot stations onto the ground at top and toe stakes.
16. Work with machinery, clearing grubbing, dozing, grading, surfacing, topping and installing drainage and bridging devices.
17. Maintain the access road to prescribed standards with reference to drainage, surface conditions, right-of-way and snow removal.

Code - 01.0603-08

Title - CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS

OBJECTIVES BY UNIT	CONTENT
Unit 1. Purpose and Objectives in Construction of Access Roads Objective 1. The student will gain skills and attitudes needed for successful employment in planning, design construction, and maintenance phases of access roads in forest areas.	A. Purpose . Provide access . Fire trails . Protection and management . Transportation of logs and other wood products . Sugarbush access . Recreation access . Other
Objective 2. The student will identify and use basic premises upon which access road construction and maintenance are based.	B. Objective Basically to provide a transportation route that will accomplish the land owners needs'at the lowest possible cost in construction, maintenance, and use
Objective 3. The student will make notes on the different kinds of access roads that can be built.	C. Basic steps in access road construction . Selection of road standards . Location of road . Survey of road . Design of road . Construction of road . Maintenance of road
Objective 4. The student will identify and use the natural factors that influence how, where and what kind of access road should be built.	D. General "rules-of-thumb" . Follow the shortest reasonable distance between two points . Follow least adverse grades . Minimize stream crossings . Plan for best drainage conditions . Plan road to meet standards for all traffic use . Locate road through areas of greatest timber volume . Balance road haul and skidding costs before planning road construction

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture on roads of the type discussed	The students will observe a variety of access roads made for different purposes . Skid roads . Sap sled roads	A type of self-evaluation by students and instructor A critique - Discuss finished job and look for faults, etc.
Field lecture on roads of the type discussed	They will note errors (lack of adequate drainage--causing erosion)	
In tour of a road planning and construction agency to observe all or as many as possible of the phases of road construction-or same as in A and B above	Possibly due to lack of attention to basic principles	
Field lecture on roads of the type that exhibit the results of following and/or not following the rules-of-thumb	Students will work on all phases of the road building project	

Code - 01.0603-08

AGRICULTURAL

Title - CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS

OBJECTIVES BY UNIT	CONTENT
Unit 2. Planning	
Objective 5. The student will identify the reasons why an access road should be carefully located before construction begins.	A. Selection of Road Standards . Purpose: to incur reasonable costs "... the choice of a forest road standard rests on reaching a sensible balance between the total cost of cheap transportation ... over an expensive road with that of expensive transportation over cheap roads." (FH: Ch 18; 10)
Objective 6. The student will correctly discern drainage and contour features on aerial photos and USGS topographic maps when roughly locating a planned access road.	. Physical standards . grade . curves . width . surface . sight clearance . Service standards . speed of travel . cost of transportation
	B. Natural site factors that influence acceptable standards for a given planned access road . Topography . Soil conditions . Climate . Type of surfacing materials available

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture on roads exhibiting the standards discussed	Students will study on a field trip different types of roads designed to different sets of road standards	The students' procedure and progress will be closely followed by the instructor
Attempt to contrast roads that satisfy the standards demanded by the types of use upon them against roads that are unsatisfactory for the use put upon them	Students will study the compilation of U.S. Forest Service road standards found in the Forestry Handbook, Chapter 18, Page 11	
	Instructor will explain on several different roads the relationship between travel use, and the standards to which the road was constructed.	
	Students will observe the influence topography, soils and climate have upon the design of roads	
Field lecture on roads to show students how the particular placement of a road has been influenced by various natural site factors		
Introduce use of aerial photos and/or USGA topographic maps to assist students in learning to weigh the merits of one location over another for a road		

OBJECTIVES BY UNIT	CONTENT
Unit 3 . Location and Survey	

Objective 7.
The student will choose and mark on an aerial photo or USGS topographic map, acceptable preferred and alternate routes between two known points.
	A. Locating road between given points (establishing preliminary "(P)" Line)
	. Use aerial photos and/or USGS topographic maps to study topographic features, drainage, contour, etc.
	. Draw tentative road location lines on photo or map
	. Observe terrain in the field and select best route (consider purpose, objective, physical and service standards, rules-of-thumb, and natural factors that influence cost of construction, maintenance and use in selecting the best route)
	. Flag the best route with special consideration to meeting grade, curve, and natural barrier limitations specified in the road standards
	. Locate road building materials
	  . access soil types on road line regarding stability
	  . locate borrow pit sites with suitable gravel

Objective 8. The student will locate on the ground the route plotted on the photo or topographic map and will blaze or flag the proposed route.	

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field observation of road construction study area with photos and/or topographic maps Field lecture with student crews supplied with aerial photos and/or USGS topographic maps	Student crews will work on the road building Instructor will set up guidelines with student foreman as to daily accomplishment	Procedure, progress and final job
Student work experience by crews with instructor as consultant		
Student work experience by crews with instructor as consultant		
Student work experience by crews with instructor as consultant		

OBJECTIVES BY UNIT	CONTENT
Unit 3. (cont'd)	
Objective 9. The student will map the flagged route line giving profile levels, distances, bearings, cross sections at grade stakes, ground conditions and will logically locate the first center line in a manner that facilitates ease of construction, use and maintenance.	B. Road Survey . Purpose . to provide data for road design . to locate the road design on the ground . prevent costly errors like adverse grades, short radius curves, poor visual distances, waste of cut and fill, etc. . Plotting final road line . following flagged "P" line - set stakes at each grade point observing grade standards for the road
Objective 10. The student will calculate cut and fill data from side shots at grade stakes.	. Obtain distances and bearings between grade stakes, take cross-section shots with abney level at each grade stake at right angles to the "P" line. Locate all features along the "P" line that may influence construction and/or design of the road. . Plot the grade line showing land features and side slope at grade points. Compute cut or fill at each grade point and plot cross-section at each grade point indicating grade level of road, bed and ditch and sideslope. . Plot optimum location of road along the general track of the grade line. Use road standards and field data to decide where the optimum location is. . Compute cut or fill at significant points along the optimum line. Use data in III. B.2c to assist . Compute and plot curves on the optimum line showing the radii, central angle, and external distance for each curve.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture		
Field lecture and student work experience by crews with instructor as consultant		
Field lecture and student work experience by crews with instructor as consultant		
Field lecture and student work experience by crews with instructor as consultant in drafting lab		
Classroom lecture and student work experience by crews with instructor as consultant		
Classroom lecture and student work experience by crews with instructor as consultant		
Classroom lecture and student work experience by crews with instructor as consultant		

OBJECTIVES BY UNIT	CONTENT
Unit 3. (cont'd)	
Objective 10 (cont'd)	. locate the optimum line on the ground by sealing off plotted distances from the grade line . lay out curves
	C. Construction staking . Clear right-of-way . Establish 100' stations on centerline . At right angles to 100' stations: offset slope stakes marking points of top of cut and toe of fill if terrain forces heavy cuts and/or fills; or, if only light grading is necessary, only set out ditching stakes (offset all side stakes to avoid their loss during grading work) . Using cross-section data, crew may inscribe on construction stakes the amount of cut or fill required to reach gradeline of the road . Maintain a close observation to assure grading equipment operators are following the centerline stakes and ditch and/or cut and fill stakes

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field and classroom lecture and student work experience by crews with instructor as consultant		
Field and classroom lecture and student work experience by crews with instructor as consultant		
Field and classroom lecture and student work experience by crews with instructor as consultant		
Field and classroom lecture and student work experience by crews with instructor as consultant		
Field lecture		

OBJECTIVES BY UNIT	CONTENT
Unit 4 . Construction	
Objective 11. The student will place line stakes in the ground using plotted center line as guide	A. Orientation to steps in construction . Clearing and grubbing . Excavation and grading . Drainage . Surface preparation . Bridging . Retaining walls
Objective 12. The student will clear right-of-way between line stakes.	B. Clearing and Grubbing . Equipment . hand tools . dozers - blade, ripper, and winch . drilling and blasting . Pioneering with blade Pushing over trees Routing out stumps and boulders Clearnig brush and downed material . Pioneering with cable Length of cable Angle of taut cable High stumping for cable removal . In swampy sites Cut stumps flush to ground Remaining root systems act to stabilize and support road
Objective 13. The student will set center line stakes every 100' and set out ditch line stakes to denote tops of cuts and toes of fills.	
Objective 14. The student will list the manpower and machinery necessary to construct the access road.	

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Classroom or field lecture and field observation of as much of the discussion material as possible. Observation of access road construction in progress is optimum.	The students will work on the project with machinery available	Stages of the construction job will be studied and assessed by the class and the instructor. Individual crews will be graded for their part in the construction.
Classroom or field lecture and field observation of as much of the discussion material as possible. Observation of access road construction in progress is optimum. (Recommend observation of blasting only make no attempt to instruct in blasting in this module as time would allow less than competent training. Do stress safety precautions for storage and handling.)		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience if work experience project includes a swampy site. Otherwise field lecture and observation of representative road site.		

OBJECTIVES BY UNIT	CONTENT
Unit 4. (cont'd)	
Objective 15. The road workers (students) will transfer cut and fill data at 100' stations onto the ground at top and toe stakes.	C. Excavation and Grading: that part of road construction during which earth is moved to attain the proper sub-grade prior to actual road surfacing work . Computation of cut and fill volumes (average adjacent end areas at 100' stations and multiply by 3.7 to obtain cubic yards of cut or fill . Obtaining fill material . turnpiking . side borrow . cut material from borrow pit . intransit loss and sub-grade settling losses
Objective 16. The students will work with machinery, clearing, grubbing, dozing, grading, surfacing, topping and installing drainage and bridging devices.	. Corduroy . over rocky terrain . over wet or swampy terrain . in bridging . Rock Removal . rock blade on dozer . blasting . ripper on dozer . excavate at least 1 ft. below rock and backfill . Safe, effective, efficient use of dozers and graders in excavation and grading . working off construction stakes . ditching and sideslope pitches

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Classroom lecture and work experience	Students will work with cut and fill data and will use office calculators in making determinations	
Field lecture and demonstration and work experience		
Use of sand box and toy machinery to show how to approach the job of cut, fill, etc.		
Improper machine use and simulation of accidents can be demonstrated well	A teaching method and student activity will be a trip to a local Department of Transportation center to see demonstration of physical characteristics of various surfacing materials, soils, etc. and discussion of road drainage	

OBJECTIVES BY UNIT	CONTENT
Unit 4. (cont'd)	
Objective 16 (cont'd)	D. Drainage: proper drainage helps preserve the stability of the road and cuts later maintenance costs . Types of drainage setups . road crown shape . ditching . culverts . open culverts . Specifications on drainage devises . materials . capacities . grades . installation . prevention of erosion by runoff E. Surfacing: provide surface that wears well and maintains its stability in extreme periods of wetness and of dryness . Grading to provide a surface that is sufficiently crowned, level for intended types of transport, and elevated to evade flooding from ditch overflow . Materials to provide stable road surface . need borrow materials where existing material will tend to be unsuitable as surfacing material . optimum soil surface material contains: • coarse aggregate up to 1 in. • fine aggregate (sand) • binding material (clay) . Soils that are nearly pure gravel, sand, silt, clay, muck, peat, or marl should have different soil types added to them to finish off road surface with an optimum soil surface material.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		

OBJECTIVES BY UNIT	CONTENT
Unit 4. (cont'd)	
Objective 16 (cont'd)	F. Bridging . Basic rules-of-thumb . minimize bridging when feasible in original road planning . bridge over stable stream bed subject to little erosion . cross at right angles to stream banks whenever possible . provide ample clearance above flood stage jam levels . do not constrict stream-flow with abutments unless proper culverts are used . Planning and Construction of Bridges . loads: dead and live . bridge site survey • minimize vertical and horizontal curves in road at both sides of bridge • build on stable stream banks • build to withstand at least 25 year high water levels (longer with more expensive bridging) • plot centerline profile at least 200' on both sides of stream and including stream bed • plot high water mark on profile and plan stronger elevation at least 3-5 feet above that level • locate pier and abutment locations on profile providing for unimpeded passage of water and debris by the piers and abutments

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 4. (cont'd)		
Objective 16 (cont'd)		
Field lecture and demonstration and work experience	Recommend use of conversion table for calculating safe loads presented in "Northeastern Loggers Handbook" Page 1 Students should observe bridges in the field to become aware of the many different approaches to the solution of crossing waterways	
Field lecture and demonstration and work experience		

OBJECTIVES BY UNIT	CONTENT
Unit 4 (cont'd)	

Objective 16 (cont'd)	• Subsurface survey to determine:
	  • bearing capacity of natural bed
	  • depth of excavation needed to reach foundation bed
	  • computation of safe allowable load for bed in pounds per square ft.
	• Abutments and Piers
	  • provide bridge support
	  • support:
	    • themselves
	    • deadload
	    • stream and backfill pressures
	  • materials
	    • earth with cribbing
	    • concrete
	• Excavation for footings or use of piles
	  • construction of coffer dams
	  • pouring of concrete for footings
	  • depth to drive piles under various bed characteristics
	  • log species and grade for use as piles
	• Stringers
	  • sizes under specific conditions
	  • computations to determine:
	    • resistance to bending
	    • shear stresses
	  • number to use
	  • preparation of logs for stringers
	    • peeling
	    • seasoning
	    • fashioning
	    • protection against decay

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Objective 16 (cont'd)	Field lecture and demonstration and work experience	
	Field lecture and demonstration and work experience	

OBJECTIVES BY UNIT	CONTENT
Unit 4 (cont'd)	
Objective 16 (cont'd)	. Decking thickness load distribution . Bridging wet and swampy sites corduroy culverts temporary log stringer bridges G. Retaining walls to prevent slides, slumps, and erosion along road bed . Cribwork with logs or railroad ties . Site survey to determine need for retaining walls H. Guard Rails . Log and concrete construction methods . Use on bridges and as road edge protection and guide

EDUCATION

01.0603-08 - Code

CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		

OBJECTIVES BY UNIT	CONTENT
5. Maintenance Objective 17. The student will maintain the access road to prescribed standards with reference to drainage, surface conditions, right-of-way, and snow removal.	A. Purpose: To keep road in condition satisfactory for traffic use requirements; to avoid road repairs that would be more costly than preventative maintenance B. Main areas of maintenance . Surface smoothness • working to pulverize • dragging to smooth out ruts • influences of wetness or dryness on the timing of various kinds of maintenance • equipment used . Maintenance regarding frost action • insulating of road • grading • limiting traffic use at key times . Washboarding • blading • improve surface stability by altering surface material composition . Mudholes • drain, clean, and fill with optimum surface material, improve drainage . Reditching • clear ditch of debris • re-excavate to remove build-up of eroded material • maintain grade • use of road grader or dozer blade . Snow removal and fencing . Daylighting wet spots . Maintenance of cleared right-of-way . Maintenance of sight clearance . Maintenance of windbreaks . Limiting dust raising with calcium chloride or waste sulfite pulp-mill liquor

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture and demonstration and work experience	Students should become aware of their responsibilities in road maintenance. The job of maintenance requires many or most of the skills the students have already learned in the module. Maintenance simply requires the application of those skills to a different set of problems.	Recite the major types of road maintenance problems that should be regularly serviced, and how that servicing should be accomplished in terms of methods, timing, and material
Field lecture and demonstration and work experience		
	Lack of time in the module, and the fact that not all road maintenance problems crop up on one or two days of the year suggest that a slide presentation of common maintenance problems and their solutions would be the best approach for instruction.	
	Stress the importance of regular thorough maintenance to avoid costly road repairs and poor service to road users.	
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		
Field lecture and demonstration and work experience		

MODULE OF INSTRUCTION

Title - CONSTRUCTION AND MAINTENANCE OF ACCESS ROADS Code - 01.0603-08

RESOURCE MATERIALS

Books -

1. Forest Engineering Handbook. U.S. Department of the Interior, Bureau of Land Management. (A guide for Logging Planning and Forest Road Engineering). 220 pp. illus.

2. Forestry Handbook. Edited by R. D. Forbes for the Society of American Foresters. The Ronald Press Company, New York, 1961

3. Meyer, Carl F., Route Surveying. International Textbook Company. Scranton, Pennsylvania. 671 pp. illus.

4. Short Cut Surveying Procedures for Local Rural Roads--Alignment, Grade, Cross-Section Drainage. J. W. Spencer, F. R. Power, A. J. Lanfear, O. K. Dast, Jr., Department of Agricultural Engineering, College of Agriculture, Cornell University, Ithaca, New York

Bulletins -

1. Simmons, Fred C., "Northeastern Loggers' Handbook." U. S. Department of Agriculture; Forest Service. Northeastern Forest Experiment Station. Agriculture Handbook No. 6. January 1951. Available through the Superintendent of Documents; U. S. Government Printing Office; Washington, D. C. 12225. Price $1.00. 160 pp. illus.

MODULE OF INSTRUCTION

Title - OPERATION OF SANITARY LANDFILLS Code - 01.0603-09

DESCRIPTION:

This module provides instruction and experience in the operation of a sanitary landfill. The student will be able to evaluate the land area as to suitability for disposal of garbage, refuse, and junk. The student will become familiar with landfill equipment such as trucks, rollers, bulldozers, and compactors. Actual separation of wastes with subsequent distribution in specific areas will be accomplished by the student.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocation	
	Class	Other
1. Importance of Operation of a Sanitary Landfill	1	0
2. Familiarity with Equipment	0	2
3. Site Review of Area	0	2
4. Separation of Solid Waste Components	0	10
5. Distribution of Solid Waste Components	0	11
6. Monitoring of Ground Water Leachate from Landfill Area	0	4
	1	29

Revised June, 1974

MODULE OF INSTRUCTION

Title - OPERATION OF SANITARY LANDFILLS Code - 01.0603.09

OBJECTIVES to be obtained:

The student will be able to:

1. Recognize and understand the importance of operating a sanitary landfill.
2. Determine the function and use of the heavy equipment such as bulldozers, rollers, trucks, and compactors, used at landfill areas.
3. Determine the drainage pattern of a suitable disposal area by looking at the contours and water table location.
4. Recognize and separate garbage, refuse, and junk for disposal in separate areas.
5. Distribute the three respective components of solid waste into areas and compact or cover with soil.
6. Determine the adequacy of operation by collecting samples of ground water leachate from a landfill area.

Code - 01.0603-09

Title - OPERATION OF SANITARY LANDFILLS

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
1. Importance of Operation of a Sanitary Landfill Objective 1 Recognize and understand the importance of operating a sanitary landfill.	A. Sources of production of garbage, refuse, and junk B. Difference between an open dump and a sanitary landfill C. Degradation of materials over a long period of time
2. Familiarity with Equipment Objective 2 Determine the function and use of the heavy equipment such as bulldozers, rollers, trucks, and compactors used at landfill areas.	A. Trucks B. Compactors C. Rollers D. Bulldozers
3. Site Review of Area Objective 3 Determine the drainage pattern of a suitable disposal area by looking at the contours and water table location.	A. Slope and drainage pattern of land B. Level of ground water C. Types of soil
4. Separation of Solid Waste Components Objective 4 Recognize and separate garbage, refuse, and junk for disposal in separate areas.	A. Garbage . Paper . Kitchen wastes . Miscellaneous items B. Refuse . Trees . Leaves . Grass C. Junk . Auto parts . Appliances . Furniture

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
The teacher will use 35 mm slides to demonstrate components of solid wastes, open dumps, and landfills	Observe teacher	Oral test
The teacher will point out the types of equipment used on site at a landfill and discuss the use of each piece of equipment while it is being demonstrated by its operator	A. Observe teacher B. Operate equipment if previously skilled	Oral test
The teacher will walk over a landfill site with the students and point out the topography, groundwater table and types of soils located in each area.	A. Observe teacher B. Walk area and point out various features to teacher	Check list of activities
The teacher will give demonstration of the separation of the components of solid waste into each respective area	A. Observe teacher B. Conduct actual separation procedures	Check list of performance

Code - 01.0603-09

Title - OPERATION OF SANITARY LANDFILLS

OBJECTIVES BY UNIT	CONTENT
5. Distribution of Solid Waste Components Objective 5 Distribute the three respective components of solid waste into areas and cover with soil.	A. Preparation of receiving areas B. Compaction of wastes C. Spreading of wastes D. Covering of area with soil
6. Monitoring of Groundwater Leachate from Landfill Area Objective 6 Determine the adequacy of operation by collecting samples of ground water leachate from a landfill area	A. Selection of sampling points B. Collection of samples C. Analysis of samples for iron and chemical oxygen demand D. Relationship of analytical values to landfill operation

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
The teacher will work with the respective operator of a land-area in the disposal of each component of solid waste in its individual area.	A. Observe teacher B. Work with landfill operation in actual disposal of components.	Check list of performance
The teacher will select sampling points, collect samples and prepare them for laboratory analysis. A set of laboratory results will be discussed with the students	Observe teacher	Oral test

MODULE OF INSTRUCTION

Title - OPERATION OF SANITARY LANDFILLS Code - 01.0603-09

RESOURCE MATERIALS

Audiovisuals:
A special set of slides (35mm) will have to be prepared by utilizing actual scenes or illustrated drawings in order to demonstrate the importance of landfill operation.

Other Materials:
No other materials are required.

MODULE OF INSTRUCTION

Title - CONSERVATION LAW

Code - 01.0604-01

DESCRIPTION:

This module is designed to focus attention on the major aspects of conservation law in New York State and the types of public relations problems that can arise. Resource people in the conservation field will be enlisted to give the students first hand learning experience. Active public relations programs will be undertaken by students to help promote better understanding and acceptance of all conservation laws pertinent to the local situation. Students will learn where and how to apply for permit and licenses covering various aspects of conservation.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. The history and development of conservation laws in New York State.	2	
2. The laws pertaining to the wildlife of New York State	2	4
3. The laws pertaining to the lakes and streams of New York State.	2	7
4. The laws pertaining to the forests and recreation areas of New York State.	2	2
5. The laws pertaining to air and water pollution in New York State.	2	4
6. Job requirements for conservation law work.	2	1
	12	18

Revised June, 1974

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MODULE OF INSTRUCTION

Title - CONSERVATION LAW

Code - 01.0604-01

OBJECTIVES to be obtained:

The student will be able to:

1. Relate the history and development of conservation law by oral topic of written report.
2. Identify the four divisions or units of conservation law as they pertain to local conditions and situations.
3. Correlate with 100% accuracy, 20 violations to all local conservation fish and game laws as found in New York State Fishing and Trapping Guide.
4. Set up and conduct a local public relations program that will be directed towards public acceptance of one phase of Conservation Law.
5. Demonstrate safe and legal use of at least one given recreational vehicle or boat by operating such under supervision to manufacturer's specifications, local laws and generally accepted safety practices.
6. Verbally list the main concepts relating to air and water pollution laws to the satisfaction of the instructor.
7. Demonstrate knowledge of personnel work of at least two persons by a written descriptive report after observing the work of these people.

01.0604-01

Title - CONSERVATION LAW

A G R I C U L T U R A L

OBJECTIVES BY UNIT	CONTENT
Unit 1 - History and Development of Conservation Law Objective #1 The students will be able to relate the history and development of conservation law by oral topic or written report. Objective #2 The student will be able to identify the four divisions or units of conservation law as they pertain to local conditions and situations.	A. Early development of Conservation Laws . Ownership of wildlife . Access problems with landowners . Formation of FWMA . Need to protect endangered species
Unit 2 - Wildlife Laws and Their Use Objective #3 The student will be able to correlate with 100% accuracy, 20 violations to all local conservation fish and game laws as found in the New York State Fishing and Trapping Guide.	A. Management Tools . Bag limits . Size limits . Sex . Season . Manner of taking B. Safety of Hunter and others . Transportation of firearms . Use of firearms . Location of hunting areas

01.0604-01 - Code

CONSERVATION LAW - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Hold discussion using chalkboard to get time relationship and develop chart of events.	A. Students write up and present short talk on one phase of conservation law development using library information. B. To recognize how laws evolved and be able to relate information in logical sequences.	A. The student will orally give a brief presentation pertaining to the history and development of conservation law. B. An oral description of the divisions of conservation law.
A. Pre-test students on present knowledge of game laws. B. Discuss ways laws are used as management tools. C. Conservation officer talk on enforcement of game laws. D. Movie.	A. Students observe conservation officer carrying out duties. B. Develop poster on why observance is better than enforcement. C. Develop hunter safety program and present to hunter safety group. D. To become knowledgeable of game laws - create understanding of game laws to help students observe laws.	A. The student will be able to recite 20 violations of the hunting, trapping and fishing regulations as stated in the official guide book for the current year.

01.0604-01

Title - CONSERVATION LAW

OBJECTIVES BY UNIT	CONTENT
Unit 3 - Laws pertaining to water - waterways and their uses. Objective #4 The students will be able to set up and conduct a local public relations program that will be directed towards public acceptance of one phase of Conservation Law.	A. Lakes . Shoreline . Travel . Pollution potential B. Streams and Rivers . Classification . Use restrictions . Ownership C. Artificial impoundments . Ponds . Reservoirs . Dams
Unit 4 - Laws and regulations pertaining to forest and recreation laws. Objective #5 The student will be able to demonstrate safe and legal use of at least one given recreational vehicle or boat by operating such under supervision to manufacturer's specifications, local laws and generally accepted safety practices.	A. Forests - Laws . Forest preserve act . Forest practice act B. Recreational - Laws . Boating laws . Transportation of recreational equipment . Operation of recreational vehicles . snowmobiles . trail bikes . all-terrain-vehicles

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EDUCATION

01.0604-01 - Code

CONSERVATION LAW - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Discussion B. Field trip C. Consultants D. Bulletins E. Reference books F. Handouts (copies of laws)	A. Take field trip to lake and determine high water line and determine legality of ownership of adjoining land. B. Take field trip to various streams of different classification and determine reasons for their classification. C. Write up project and apply for necessary permits. D. Take field trip to various water impoundments and determine legality. E. Hand out copies of conservation law part 611-Article V and classification standards of fresh water for county.	A. Evaluation will be on the contents of the public relations program that the student conducts.
A. Discussion B. Resource People C. Handouts D. Movie E. Bulletins F. Maps G. Charts	A. Take field trip to marina and check boats for legality of equipment and operation. B. Inspect recreational vehicles in shop and add equipment to legalize their use. C. Post rules of operation of boats and other recreational vehicles in public places. D. Practice operating recreational vehicles to become competent legal operators. E. Print cards indicating student competencies for operation of vehicles.	A. Teachers observation of the student's demonstration.

01.0604-01

Title - CONSERVATION LAW

OBJECTIVES BY UNIT	CONTENT
Unit 5 - Laws pertaining to pollution control. Objective #6 The student will be able to verbally list the main concepts relating to air and water pollution laws to the satisfaction of the instructor.	A. Air . State laws . Federal laws B. Water . State laws . Federal laws C. Status of pollution . Law in future
Unit 6 - Job requirements for conservation law work. Objective #7 Students will demonstrate knowledge of personnel work of at least two persons by a written descriptive report after observing the work of these people.	A. What are duties of conservation personnel . Training required . Education required

EDUCATION 01.0601-04 - Code

CONSERVATION LAW - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Discussion B. Newspaper articles C. Bulletin board D. Bulletins E. Handouts	A. Collect news media on pollution matters for minimum of three weeks and post on bulletin board. B. To understand and relate condition of pollution locally where violations occur. C. To ready and interpret news media as to pollution law and regulations which are current and projected.	A. Verbally review the main concepts of air and water pollution.
A. Discussion B. Interview C. Handout	A. To understand job qualifications for conservation law work and be able to judge if this is a field of work you would be interested in pursuing as a career.	A. Evaluation of written reports.

RESOURCE MATERIALS

A. Books -

Clepper, Henry ed., "Origins of American Conservation", N. Y. Ronald Press
4.50

Bregman, J. I. and Sergei, Lenormand, "The Pollution Paradox"
Washington, D. C. Spartan, 1966. $4.95

Smith, Frank E., "The Politics of Conservation", New York, Random House
$5.95

B. Bulletins -

Current, N.Y.S. Hunting-Trapping-Fishing, Guide

Copy - Amendment, Part 611, Use and Protection of Waters' - Rules and Regulations
Issuance of Permits under Conservation Law, Article V, Part IIIA

Copy - Classifications and Standards of Quality and Priority assigned to fresh
Surface Waters Adopting Order. (for county)

RESOURCE MATERIALS (cont'd)

C. Periodicals -

Conservation of Natural Resources - Home Study Guide
Booklet V - Wildlife Law
Booklet IV- Forest Resources

Information Leaflet - NYS Cons. Dept.
New York State's Forest Preserve

Handbook - ACP. NYS. Dept. Agri.

Bulletin 21 - The New York Forest Practice Act. NYS. Cons. Dept.

D. Audiovisuals -

Movie - "Lets Keep America Beautiful"
N.Y.S. Office for Local Gov.
155 Washington Ave.
Albany, New York 12216

Conservation Law

Articles Appearing in the New York Conservationist	MONTH AND YEAR
A Look at New Legislation	- AM-47
Big Game Season for Archers	- AS-48
Enforce Law on Hen Birds	- ON-46
Grist for the Mill	- DJ-47-48
New Legislation	- FM-47
1948 Legislation Hopper	- AM-48
Summary 1948 Legislative Season (Supplement)	- AM-48
THREE New Proposals	- DJ-46-47
Clearing up the Bear Laws	- ON-51
Fire Armsfor Minors	- DJ-49-50
How We Decide on Beaver Seasons	- FM-50
Legislation 1951	- AM-5[illegible]
Problems in Legislation	- DJ-49-50
Public Fly Fishing	- AM-52
Should We Get Tougher	- DJ-50-51
Signboards in the Adirondacks	- AS-50
There Oughta Be a Law	- DJ-51-52
To Pick or Not to Pck (Wild Flowers)	- AM-50
Antlerless Deer Season, 1955	- ON-55
A Prophet in His Own Country	- FM-55
Back Tags for Hunter	- AS-54
Legislation 1955	- JJ-55
Licenses	- JJ-55

License Q's and A's	- ON-54
Mining Laws of New York	- FM-55
1955 Small Game Hunting Maps	- AS-55
Regulations (Bait Fishing)	- DJ-54-55
Small Game Seasons (1954 Small Game Hunting Maps)	- AS-54
Spear Fishing	- AS-55
Changes in the License Year	- JJ-57
Duck Stamp Sale in New York and What it Means In Water Fowl Pressure In Water Fowl Management	- DJ-57-58
New Laws for 1958	- JJ-58
New Legislation - 1957	- JJ-57
1956 Small Game Hunting Map	- AS-56
1957 Small Game Hunting Map	- AS-57
Conservation Legislation	- JJ-59
Early Beaver Season	- DJ-58-59
New York's FWMA	- DJ-59-60
Side Arms	- FM-60
Small Game Season 1958	- AS-58
The Back Patch	- AM-60
The Fish and Wildlife Management Act	- FM-59
The Seelye Law	- FM-60
The Small Game Season for 1959	- AS-59

3.00 Duck Stamp - DJ-58-59

What's New in the Law for "60" - JJ-60

Can's and Red Heads -- No - ON-60

Licenses for the Military - AS-60

Goodbye Dan'l Boone - FM-64

Gun Laws for Boys - ON-62

Law Enforcements Strengthened in Marine Districts - AS-63

New Laws Affect Sportsmen - AS-63

Answers on Hunting Rules - AM-65

Capsule: The Wilderness Act - FM-65

New Steps Protect Bald Eagle - AM-66

New Wildlife Import Regulations - ON-65

Publishing Research and the Law - ON-65

Snowmobiles in the Forest Preserve - FM-66

The New Stream Protection Law - FM-66

Confused on Grouse Season - DJ-67-68

Conservation Officer Seminar - AS-67

Hudson Riverway Law - DJ-66-67

Protected and Unprotected Wildlife - ON-66

Proposition One - ON-66

Senior Citizen Licenses - AM-67

Dan Nev
Student
Hornell BOCES

MODULE OF INSTRUCTION

Title - FARM AND FOREST GAME MANAGEMENT Code - 01.0604-02

DESCRIPTION:

This module is designed to give the student an understanding of the characteristics and requirements of both farm and forest game animals. The students will learn present day management techniques through actual field and forest situations and experiences. The knowledge of local animals and their life cycles will be an important aspect of this module.

MAJOR DIVISIONS OR UNITS OF CONTENT		Time Allocations	
		Class	Other
1.	The Principles of Game Management	4	2
2.	Farm Game Management and Programs for Specific Game Species	2	9
3.	Forest Game Management and Programs for Specific Game Species	2	11
		8	22

Revised June, 1974

MODULE OF INSTRUCTION

Title - FARM AND FOREST GAME MANAGEMENT Code - 01.0604-02

OBJECTIVES to be obtained:
The student will be able to:

1. Recognize and describe the stated basic needs and relationships that exist in all wildlife and identify one major limiting factor and suggest one solution to rectify the problem for each species in farm and forest sections.

2. List and describe the opportunities and problems in relation to man's co-existence with wildlife.

3. List and describe the four basic principles of farm game management and by touring a farm be able to spot any deficiencies in habitat for a particular species.

4. Plan for and complete at least two recommended game management practices on a given farm.

5. Recommend a course of action for an animal damage claim on a given farm.

6. List and describe the present day principles of forest game management.

7. Suggest and implement at least one habitat improvement practice for each of the important forest game species in his area.

Code - 01.0604-02

AGRICULTURAL

Title - FARM AND FOREST GAME MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
Unit #1 - Principles of Game Management 1.Recognize and describe the stated basic needs and relationships that exist in all wildlife and identify one major limiting factor and suggest one solution to rectify the problem for each species in farm or forest sections.	A. Identifying and recognizing basic needs, relationships, natural limits.
	B. Natural communities Basic Ecological Structure Appreciation and Enjoyment of Wild Communities
	C. Average annual survival - common game species Population increase - spring to fall Population decrease - annual mortality Tabulations and measurements
	D. Principles of importance . Space requirements and life spans . Variations . Limited food supplies . Concentration problems . Food chain dependencies
	E. Predation, depredation or competition
	F. Study relative carrying capacity of selected areas.

EDUCATION 01.0604-02 - Code

FARM AND FOREST GAME MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Using reprint of NYS Conservation Dept. Series 1 - Characteristics of Wildlife. Have students read in class and underline the basic principles described. List on overhead. Discuss man as an animal subject to same characteristics.	Student will enter into discussion of the principles of game management.	
B. Reprint of NYS Conservation Dept. Series 2 - The Wildlife Community. Make transparency of centerfold and use in class discussion of affects and effects. Give quick test, 10 min. or pass out sheet at end [illegible] period, to have students fill in missing lines of dependence as shown in centerfold.	Student will prepare a report including all the principles of game management and give a description in his own words of each principle.	Evaluate reports as to completeness and accuracy.
C. Reprint of NYS Conservation Dept. Series 3 - Wildlife Dynamics. Read and discuss. Can do math problem on mice. How many at end of one summer season from one pair breeders with unlimited feed and no losses. Another Spring - Another Generation.		
D. Read reprint from NYS Conservation Dept. The Balance of Nature. List principles on board or overhead - discuss. Transparency of hypothetical fox-pheasant simple relationship. Discuss. Emphasize nothing static in wildlife, always changing.		
E. Read Conservation Dept. reprint, Predation, Depredation or Competition. Discuss as the animal views it, man's view. Importance to survival of species. Film - A Way of Life - discuss. Suggested reading - Never Cry Wolf - Farley, Mowatt-Dover paperback. Predation-NYS Conservation Dept. reprint.		

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
F. To compare natural carrying capacity of various stages of succession, 24 hour small rodent surveys representing 1/100 acre plots (4½' X 100') could be taken on open field-hayfield, early brush, mature forest and climax forest situations. Records of weather conditions, description of stations and record of successful captures would be necessary. Twelve mousetraps or live traps per plot. Bait with oatmeal flakes.	Student will in the field participate in a survey of small rodents in different environmental settings. Results will be recorded and handed in along with conclusions.	Evaluate survey.

Code - 01.0604-02

Title - FARM AND FOREST GAME MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
2. List and describe the opportunities and problems in relation to man's co-existence with wildlife.	G. Wildlife and man-effects of wildlife on man Cityman's views The future outlook in wildlife management.
Unit #2 - Farm Game Management	
3. List and describe the four basic principles of farm game management and by touring a farm be able to spot any deficiencies in habitat for a particular species.	A. Cottontail management
4. Plan for and complete two recommended game management practices on a given farm.	
5. Recommend a course of action for an animal damage claim on a given farm.	B. Study specific requirements of pheasant habitat. Rearing techniques of game farms.
	C. Study specific requirements of other farm game birds. •Hungarian partridge •Quail .Exotic birds

01.0604-02 - Code

FARM AND FOREST GAME MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Read Conservation reprint #4, NYS - emphasize six major values. Discuss - Read Conservation reprint #11 - NYS City Man's View Discuss series 5 - Challenges in Wildlife Management		
Read and discuss NYS Cons. Dept. reprint Farm Game Management Read and discuss principles as outlined in Wildlife Management Cornell Series in Natural Resources Making Land Produce Useful Wildlife - USDA No. 2035 Field Study	Student will survey a farm or school land and will record the strengths and deficiencies in habitat for a given farm. Hand in survey.	Evaluate survey.
Read and discuss NYS Cons. Reprint Want More Rabbits? Part 1 and 2 as homework SCS Information sheet NY-36-Land Management for Cottontails Film - Cottontail NYS Conservation reprint - Shrubs and Vines for Wildlife Cover and Food Field exercise - trapping Do one of the suggested management practices.	Construct wooden box traps. Student teams set out traps as in mouse survey. Leave traps out 5 days. Mark rabbits caught so they won't be recorded twice. Prepare and plant food and cover strips. Plant selected shrubs. Construct brush piles.	Evaluate student activities for completeness of work.
Read and discuss NYS Cons. Dept. pamphlet - The Ringneck in New York - Cornell Bulletin #97 - Pheasant Management and Rearing, New Pheasant Policy - NYS Cons., Oct-Nov 1969 The Ringneck - Olin-Matheison Shooting Preserve Management by Sportsmen's Service Bureau Shooting Preserve Management by the Nile System - Olin Matheison Field exercise - one management practice. Visit shooting preserve locally. Read and discuss habitat requirements of game birds other than native pheasants. New Pheasant Introductions - NYS Conservationist - Oct-Nov 1968 Discuss why some species introductions do not work.	Students will do one of the following activities: . Rear pheasant chicks . Prepare and plant food and cover strips . Plant selected shrubs Visit to a local shooting preserve. Observe management practices in the raising and releasing of birds.	Field trip report.

OBJECTIVES BY UNIT	CONTENT
	D. Farm, crop and structure damage by wildlife
Unit #3 - Forest Game Management 6.List and describe the present day principles of forest game management	A. Principles of forest game management
7.Suggest and implement at least one habitat improvement practice for each of the important forest game species in his area.	B. Specific problems . Whitetail deer .Grouse .Squirrels .Turkey .Snowshoe hare

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Review problems identifiable in locality from birds, woodchucks, skunk, raccoon, bats, mice, rats, fox, opossum, weasel, etc. Reprints on each from U.S. Dept. of Interior, Fish and Wildlife Service. Woodchucks - Pa. Game Commission. Trapping - Fur Management - Cornell Bulletin No. 101 Review state and federal laws where applicable.	Student will observe and record damage done to a farm by one of the mentioned animals. Student will suggest ways to combat the problem.	Quiz on farm game species.
Read and discuss reprint NYS Cons. Dept. Forest Game Management. Field trip to local wooded area.	Student will observe on a visit to a forested area the habitat of forest game. Record the strengths and weakness in this particular woodlot for a given species.	Oral quiz on principles.
Show film The Whitetail in N.Y. Outline and discuss. Record problems similar to local situation. Review pamphlet, Deer in NYS - Cornell No. 1189 - Discuss management. Discuss Deer Trapping and Tagging - NY Conservationist, Feb-Mar 1969 How to Age a Deer - NY Cons. reprint - Field Techniques for Sexing and Aging Game Animals - Wisconsin Laws Regulating Harvest. Discuss. Field exercise. Note: The following animals can be assigned to students to prepare written and/or oral reports for class presentation and stimulation of discussion.	Student will visit a forested area and observe the habitat as it applies to deer. Look for sizes of browze and over browzing. Check for deer yards if in area. Suggest habitat improvement projects and carry out one such improvement project: - clear cutting - thinning - increasing edge of woods - planting wildlife shrubs	Evaluation of student project as to planning and implementing.
Study grouse habits and requirements. Ruffled Grouse - Olin Matheison Co. - Wildlife Habitat Changes on Connecticult Hill Game Management Area p. 60 Field exercise	Student will prepare written and/or oral report on one forest game species. Student will complete one management practice for one of the species of game re: grouse, turkey, squirrel, or snowshoe hare.	Evaluate report.

Code - 01.0604-02 A G R I C U L T U R A L

Title - FARM AND FOREST GAME MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
	. Raccoon . Bear . Beavers and other fur bearers . Foxes

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Raccoons and their habits should be studied. Types and extent of damage. Methods of control. Pelting techniques. Related game laws.	Student observation in field of damage done by raccoons. If heavy damage is evident set up a trapping program (observe laws). Students skin any animals caught.	
Annual harvest report Black Bear in NYS - Conservationist	Studies of bear, beaver and other fur-bearers rely on the oral or written reports as assigned in previous section. Students complete and edit these reports into a booklet.	
Recognize values and problems in relation to man.		Quiz on module.
Reports on value of and problems of fox populations. Rabies. If bear or beaver are important where this module is being taught, Habitat Improvement Projects will be in order.		

MODULE OF INSTRUCTION

Title - FARM AND FOREST GAME MANAGEMENT Code - 01.0604-02

RESOURCE MATERIALS

A. Books -

Never Cry Wolf - Farley Mowa H. - Dover - $1.75

The Ringneck Pheasant - Olin Matheison- $1.00

Shooting Preserve Management, the Nilo System - $4.95

Shooting Preserve Management, Sportsmen's Service Bureau $1.00

Ruffed Grouse - Olin Matheison $1.00

The Whitetail Deer - Olin Matheison- $1.00

Squirrels - Olin Matheison- $1.00

The Black Bear

The Red Fox

Farm and Forest Game Management

  Animal Control - Eadie

  Wild Turkey and Its Management - Edited - O. H. Hewitt

  Ruffed Grouse in New York - Bump et al

  Alien Animals - George Laycock

  Wildlife Management Techniques - 3rd Ed. - Giles

  Deer of North America - Taylor

  Whitetail Deer in Wisconsin - Dahlberg & Guettinger

  Game Management - Aldo Leopold

MODULE OF INSTRUCTION

Title - FARM AND FOREST GAME MANAGEMENT **Code - 01.0604-02**

RESOURCE MATERIALS

B. Bulletins -

New York State Conservation Department - Reprints:
The Wild Turkey in Eastern Colorado-Dept.of Fish & Game,Denver, Colo.
Characteristics of Wildlife
The Wildlife Community
Wildlife Dynamics
The Farmer and Wildlife
Wildlife Mgmt.Institute, Washington,D.C.
Another Spring-Another Generation
Balance of Nature
Predation, Depredation or Competition
Predation
City Man's View
Challenges in Wildlife Management
Protected and unprotected Wildlife
Farm Game Management
Want More Rabbits
Shrubs and Vines for Wildlife Cover and Food
Forest Game Management
How to Age a Deer
Land Management for Snowshoe Hare - USDA - NH - 44
Wildlife Management - Cornell Series - Conservation - Home Study Course
Grey Squirrels - Penn. Game Commission - Harrisburg
Field Techniques in Sexing and Aging Game - Wisconsin Game Dept.
Deer in New York State - McNeil - Cornell No. 1189
Trapping and Fur Management - Cornell Bull. No. 101
Pheasant Rearing - Cornell Bull. No. 97
The Ringneck in New York - New York Conservation Dept.
Land Management for Cottontails - SCS-NY-36
Making Land Produce Useful Wildlife USDA #2035
New York Fish and Wildlife Resource - N.Y.Cons.Dept.

C. Periodicals -

New York State Conservationist
Pennsylvania Game News

D. Audiovisuals -

Film - A Way of Life - Redfield Gunsight Co. - free
Film - Cottontail - NYS Conservation Dept.
Film - The Whitetail in New York - NYS Conservation Dept.
Film - The Rabbit that Runs on Snowshoes - NYS Conservation Dept.

MODULE OF INSTRUCTION

Title - WETLAND GAME MANAGEMENT Code - 01.0604-03

DESCRIPTION:

The student will develop and maintain shallow water marsh area for water fowl and manage the area to increase its carrying capacity for water fowl. The management practices for water fowl will help the production of some furbearing animals. However specific management practices for furbearers will not be stressed. The value of a wetland for water fowl will be stressed, for its esthetic as well as economic value.

MAJOR DIVISIONS OR UNITS OF CONTENT		Time Allocation	
		Class	Other
1.	The need for the development and management of wetlands for water fowl.	2	0
2.	Essential habitat elements of a marsh	1	4
3.	Wetland development	2	14
4.	Management of a wetland	1	6
		6	24

Revised June, 1974

MODULE OF INSTRUCTION

Title - WETLAND GAME MANAGEMENT Code - 01.0604-03

OBJECTIVES to be obtained:

The student will:

1. Predict, by studying a topographical map, the wetland areas in a locality which could be developed as a wildlife marsh.
2. Identify the essential elements of a wildlife marsh area and understand the basic concepts in the construction of these components.
3. Compare, by studying different wetland areas, the different systems of water impoundments including size, water control structures, dike construction and territorial boundaries.
4. Participate in the construction of potholes, level ditches, and shallow excavations both with heavy equipment and blasting materials.
5. Identify the equipment to be used in the construction of a wetland area, and be able to satisfactorily operate equipment in the construction of a wetland area.
6. Identify the types of water controls to use in managing the marsh for optimum production of desirable plants.
7. Identify the types of treatments such as fertilization, liming, and tree removal, to get the most production in a wetland area.
8. Identify the enemies of water fowl and use the controls necessary to rid a wetland of these undesirables.
9. List the migration dates and broad hatching dates for geese, mallards and woodducks and recognize the use of these dates in managing a wetland.

Code - 01.0604-03

Title - WETLAND GAME MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
Unit 1.- The need for the development and management of wetlands for waterfowl. Objective 1. Predict, by studying a topographical map, the wetland areas in a locality which could be developed as a wildlife marsh.	A. The value of a marsh . Esthetic . Wildlife . Hunting . Long term economics
Unit 2. - Essential habitat elements of a marsh. Objective 2. Identify the essential elements of a wildlife marsh area and understand the basic concepts in the construction of these components.	A. Water . Water - Marshes . depth and variance in depth . water control structure . territorial dividers within water impoundment. . Water - potholes, level ditches and shallow excavations . used where water hole is high. . Flooded duck fields . seeds . flooded for waterfowl food . Waterfowl use of ponds . changes in regular pond to attract waterfowl. B. Nesting cover . Undisturbed . Species of waterfowl and requirements . Planting nesting cover. C. Escape cover . Edge effect. D. Loafing sites - floating logs, rafts, piles, rocks, etc. E. Territories F. Foods and soil relationship . Wild plants . Domestic grains . Forage

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Lecture One or more of the following films - Marsh Waters - Waste or Wealth Marshland is not Wasteland World in a Marsh or Pond Class Discussion	Student discussion of the values of a wetland area vs. its value for other types of development re: airports, residential - land fill etc.	Observe students in discussion
Field trip or trips to an established Marsh area (Montezuma National Wildlife Preserve would be excellent). A. Guides tour by a wildlife biologist. B. Observe Marshes, water control, potholes, flooded duck fields, etc. C. Check nesting cover, escape cover, loafing sites territories, and food. (SES Manual - Wildlife Wetland Development Biology #11)	Student observation of the various types of water impoundments. Student should be aware of depth of water, types of water control and territorial divisions. Student report to be handed in.	Evaluation of student report.

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Code - 01.0604-03

Title - WETLAND GAME MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
Unit 3. - Wetland Development Objective 3. Compare, by studying different wetland area, the different systems of water impoundments including size, water control structures, dike construction and territorial boundaries.	A. Marsh developments . Size and depth . Water control structures . Dam construction . Construction of spillways . Construction of territorial boundaries within a marsh.
Unit 3.- Objective 4. Participate in the construction of potholes, level ditches, and shallow excavations both with heavy equipment and blasting materials.	B. Construction of marsh area in areas of high water table. . Potholes . excavation by backhoe . blasting . size . Level ditches . size . spoil for nesting and boundaries . Shallow excavation . size and boundaries . use of spoil
Unit 3. - Objective 5. Identify the equipment to be used in the construction of a wetland area, and be able to satisfactorily operate equipment in the construction of a wetland area.	

EDUCATION

01.0604-03 - Code

WETLAND GAME MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field Lecture Guest Lecturer - SCS man of wildlife biologist Field exercise Written plan for a wetland area to be actually constructed.	Student participates in the planning and construction of one or more of the wetland areas. Requires skill in operation of bulldozer, backhoe, transit and related equipment. Hand in plan.	Evaluate written plan.
	Blasting will be done by a qualified person such as a wildlife biologist or SCS agent.	Evaluate student use of equipment used to plan and construct the wetland area.
	Wetland can be constructed on school land on a farm near the school.	

Code - 01.0604-03

AGRICULTURAL

Title - WETLAND GAME MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
Unit 4. - Management of a wetland. Objective 6. Identify the types of water controls to use in managing the marsh for optimum production of desirable plants. Unit 4. - Objective 7. Identify the types of treatments such as fertilization, liming, and tree removal, to get the most production in a wetland area. Unit 4. - Objective 8. Identify the enemies of waterfowl and use the controls necessary to rid a wetland of these undesirables. Unit 4. - Objective 9. List the migration dates and broad hatching dates for geese, mallards and woodducks and recognize the use of these dates in managing a wetland.	A. Water Control . Drawdown of water . for unproductive acid soils . bottom treatment for sterile and unproductive soils . tannin stain in water . toxic chemicals and O_2 deficiency . solid stands of undesirable plants . Flooding to kill undesirable plants B. Sustaining production . Drawdown of water for extended periods . Needs for auxiliary water C. Enemies of waterfowl . Turtles, bass, fox, raccoon, mink, skunk, squirrel, rats, certain hawks and owls. . Carp and bullhead . Domestic animals - cats and dogs D. Recreational use of waters . Waterfowl prefer undisturbed areas. E. Migration dates . Implications F. Broad Hatching dates . Implications

EDUCATION

01.0604-03 - Code

WETLAND GAME MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Field Lecture B. Field exercise on an established wildlife marsh if possible. C. Or field trip to an established wetland to watch management practice going on.	Student should particpate in the management of a wetland area if at all possible. Management practices, which would take place during the time the modules are being taught, can be used. Such things as trapping snapping turtles,* controlling bullheads and carp will fit in easily. Student report on field trip to observe management practices on an established wetland area. *Fish Pond Management Biology #7 SCS Bulletin Pg. 6E3.	Evaluate student work in the management. or Evaluate student report on field trip.

MODULE OF INSTRUCTION

Title - WETLANDS GAME MANAGEMENT Code - 01.0604-03

RESOURCE MATERIALS

A. Books -

Pond Life - Golden Nature Guide Series - $1.25

Wetlands - Duck, Geese and Swans of North America - Kortwright
U.S. Dept. of Interior

Waterfowl Tomorrow - Joseph Linduska

Canvasback on a Prairie Marsh - Hauchbaum

B. Bulletins -

An Acre of Marsh is Worth Saving - - - - N.Y.S. Cons. Dept. Reprint
Your Stake in Wetlands - Circular 140 - U.S. Dept. Interior
Superintendent of Documents
The Role of Tidal Marshes in Estuarine Production - N.Y.S. Cons. Dept. Reprint
Wetlands Preservation on Long Island - N.Y.S. Cons. Dept. Reprint
The Ecology of a Bog - N.Y.S. Cons. Dept. Reprint
Management of Wetlands Wildlife - N.Y.S. Cons. Dept. Reprint
Muskrats - Pennsylvania Wildlife Resources, % Penn State
Beavers - University Park, Pa.
Turtles of N.Y.S. - N.Y.S. Cons. Dept. Reprint
Frogs and Toads - N.Y.S. Cons. Dept. Reprint
Primary Waterfowl of N.Y. - N.Y.S. Cons. Dept. Reprint
Some Marsh and Aquatic Waterfowl Food Plants - N.Y.S. Cons. Dept. Reprint
Waterfowl Marshes and Menus - N.Y.S. Cons. Dept. Reprint
Land Mgt. for Ducks - Information Sheet No. 39 - U.S.D.A. Soil Cons. Serv.
700 East Water Street
Syracuse, New York
The Mallard - Conservation Dept. Olin Mathieson Chem. Co. East Alton,
Illinois $1.00 - (Available from Cornell Service)
Wood Duck Nest Box - N.Y.S. Cons. Dept. Reprint
Anatomy of a Duck - N.Y.S. Cons. Dept. Reprint
Shore Birds of N.Y.S. - N.Y.S. Cons. Dept. Reprint
Wildlife Wetlands Development, Biology #11 available SCS
Fish Pond Management, Biology #7 available SCS

RESOURCE MATERIALS (cont'd)

C. Periodicals -

New York State Conservationist

D. Audiovisuals -

Films - Marsh is Not Wasteland - N.Y.S. Conservation Dept.
World in a Marsh " " "
Pond " " "
Marsh Waters - Waste or Wealth - Cornell Film Lib.
Environmental Pollution (Set of 6 filmstrips) Produced in 1969 available from numerous film sources or purchased from Wards Natural Science Catalog, Rochester, N.Y. About $40. (excellent)
Calling All Ducks - N.Y.S Cons. Dept. film Lib. or Ducks Unlimited
Dividends in Ducks " " " " " "
Duck Hunters Dilemma " " " " " "

MODULE OF INSTRUCTION

Title - WILDLIFE DISEASE AND PEST CONTROL Code - 01.0604-04

DESCRIPTION:

This module will give basic training to students working in all resource fields, the management objective of controlling wildlife numbers, and the role of disease in animal populations.

Included are disease diagnostic methods combined with laboratory work involving mortality analysis.

Students will be involved in field methods of animal control and gain insight to various control equipment and techniques.

As many control programs are run as to coincide with the harvestable surplus of various animals;methods of handling a fur crop are also included.

Other areas that will be examined will include the ecological impact and animal population dynamics.

	DIVISIONS OR UNITS OF CONTENT	Time Allocation	
		Class	Other
1.	Big Four in Wildlife Mgt.	1	2
2.	Life Histories	1	2
3.	Cause of Death Necropsy and Investigation	1	2
4.	Trap types care and use	1	3
5.	Live trap construction	1	4
6.	Trapping Methods	1	2
7.	Pelt Preparation	1	5
8.	Natural & Induced control methods	1	2
		8	22

Revised June, 1974

MODULE OF INSTRUCTION

Title - WILDLIFE DISEASE AND PEST CONTROL Code - 01.0604-04

OBJECTIVES to be obtained:

The student will be able to:

1. State or list the universal "Big Four" of Wildlife management and apply proper defintion to each.
2. Apply limiting factor criteria to a specific given animal by giving orally a two-five minute report.
3. Diagnose the possible cause of death, when given specific investigation clues, using a diagnostic key.
4. State or list the correct name for nine of ten displayed trap styles and types.
5. Construct a workable wooden live trap using construction plan guides.
6. Demonstrate in the field one trapping set that displays the technique for harvest of a specific animal.
7. Investigate in the field a natural observed control or its visual evidence and present findings in a one - five minute discussion.
8. Demonstrate by laboratory exercise or by answering nine of ten questions on moult, primeness and pelt preparation.

Code - 01.0604-04

Title - WILDLIFE DISEASE AND PEST CONTROL

OBJECTIVES BY UNIT	CONTENT

Unit 1 Big Four in Wildlife Mgt.
Objective 1
State or list the universal "Big Four" of wildlife management and apply proper definition to each.
	Big Four
	. Regulating Factors
	. Carrying Capacity
	. Limiting Factors
	  . production
	  . complete habitat
	. Harvestable Surplus
	. Population turnover
	  . fecundity
	  . gestation

Unit 2 Life Histories
Objective 2
Apply limiting factor criteria to a specific given animal by giving orally a two-five minute report (Life history information guides will be supplied for self study)
	Life History Outline
	. History content
	. Use of limiting factors in control
	. Environmental limitation
	  . limiting factors (i.e. prey, food, cover types, water, etc.)
	. Fitting environment to species
	. Missing food chain links
	. Man caused limiting factors
	  . natural limiting factors
	  . management for limiting factors

Unit 3 - Cause of Death Necropsy and Investigation
Objective 3
Diagnose the possible cause of death, when given specific investigation clues, using a diagnostic key.
	Investigation Procedures
	. Site examination
	  . local
	  . surroundings
	. Body examination
	  . safe handling
	  . field care
	  . external clues
	. Necropsy examination
	  . safe handling
	  . autopsy
	  . possible death causes
	    . see enclosed diagnostic key for 33 possible death causes.
	. Professional Diagnosis
	  . D.E.C. Pathology lab
	  . preservation and handling of carcass.

E D U C A T I O N

01.0604-04 - Code

WILDLIFE DISEASE AND PEST CONTROL - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Lecture and discussion of any local animal including man; correlate his existance to the framework of the "Big 4" Visual aid using the "hour glass" technique of imposing limiting factors to a population	Students to fully participate in fitting the "Big 4" to an animal during discussion. Student to list the "Big 4" and in his own words define their meanings. When completed it will be handed it to the instructor.	Oral participation will aid understanding of life's regulating forces through involvement. Oral or written test questions will enforce understanding.
Students to be given prepared life history outlines of animals commonly controlled in resource management. Some suggested species raccoon, red and grey fox, common crow, coyote, white tail deer, fisher, weasel, muskrat, bobcat, hare, rabbit, etc. Student preparation and presentation followed by class critique.	Student gains insight into animals by self study of life history. Insight will then be applied to prepare a limiting factor talk focusing on natural and induced population control.	Talk to be analyzed and evaluated by class participation. A written general information test can be administered on the various talks if desired.
Field study of actual or staged death with tail gate discussion of observation. Demonstration or full participation if specimens available of internal investigation procedure. Use of death causing diagnostic key to determine probable fatality when given diagnostic clues.	Field observance and assisting in internal investigation in the lab. Student to try his hand in diagnosing death using the enclosed key.	Oral or written testing for correct cause when given investigation clues.

Code - 01.0604-04

AGRICULTURAL

Title - WILDLIFE DISEASE AND PEST CONTROL

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Trap care and use Objective 4. State or list the correct name for nine of ten displayed trap styles and types.	A. Basic trap types . Steel traps . jump and coil spring . Conibear and cosey killer . Live traps . Drive traps . Aldrich Leg Snare . Bird traps . cannon nets . mist nets B. Trap Care . Chains . Springs . Cleaning . Dying and boiling C. Trapping gear . Wax paper . Wire . Scoop . Basket . Miscellaneous D. Bait and Lure . Types . Application
Unit 5 - Live trap construction Objective 5. Construct a workable wooden live trap using construction plan guides.	Live traps . Construction material . Door types . Rocker bait board . Size and design
Unit 6 - Trapping Methods Objective 6. Demonstrate in the field one trapping set that displays the technique for harvest of a specific animal.	Types of sets . Blind sets . Decoy sets . Covey sets . Dirt hole sets . Water sets . Miscellaneous

01.0604-04 - Code

WILDLIFE DISEASE AND PEST CONTROL - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Demonstrate setting and care of basic traps. Students participate in setting, identifying and handling.	Students through handling and study prepare for an identification quiz. Students collect hemlock bark and hardwood chips. Boil traps to color and clean. Set a trap or two at beginning of unit in log type waters. Collect at end of unit and observe color.	Visual observation to properly identify traps, care for traps and properly use. Answers can be oral or written.
Lecture and Demonstration Packet of trap construction plans made available to each student. Visitation by local trapper.	Student chooses desired plan and constructs live trap to specifications.	Test trap for workability and craftsmanship.
Self study and field application	Students study instructional handouts, pick a specific set for a particular animal and demonstrate the lay out in the field.	Orally quiz with questions pertaining to trap size, site selection, animal selectivity and reasons for choice.

Code - 01.0604-04

AGRICULTURAL

Title - WILDLIFE DISEASE AND PEST CONTROL

OBJECTIVES BY UNIT	CONTENT
Unit 7 Pelt Preparation Objective 7. Investigate in the field a natural observed control or its visual evidence and present findings in a one - five minute discussion.	A. Natural Control B. Induced Control C. Objectivity of Control . Species Mgt. (i.e. goose management) raccoon control) . Depredation . crops . game . esthetic D. Legality of control . Permits . Agencies . N.Y.D.E.C. N.Y. State . Division of Wildlife Services Bureau of Sport Fisheries & Wildlife E. Control controversy . Ecological balance . Species management . Habitat management vs. instant control . Harvestable Surplus . Secondary poisoning . Missing trophic levels and detriment to local eco-systems . Control objectivity . Politically motivated controls
Unit 8 - Natural & Induced Control Methods Objective 8. Demonstrate by laboratory exercise or by answering nine of ten questions on moult, primeness and pelt preparation. (To Instructor Note) -(Many control practices initiated during "prime" season to utilize harvestable wildlife to the best advantage.)	A. Fur . Durability rating . Components B. Primeness C. Condition D. Skinning techniques . Cased . Open and square E. Fleshing and stretching

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Visitation by local trapper or resource employee familiar with control methods. Lecture and discussion Field trip.	Using field observations combined with lecture notes discuss the hows and whys of control methods in a one-two minute class preparation.	Talk to be analyzed and evaluated by class. A written general information quiz on lecture material and discussion may be given.
Demonstration of techniques in contents. Visual Aids - pieces of different animal fur Participation (if unit given during trapping season, animals can be easily secured for use).	Students study fur pieces (Note: Fly tying materials catalogs contain many fur remnants). Students note components, animal species primeness and condition and indicate answers to the instructor. If animals can be secured students can prepare pelts for sale to local fur buyer.	Oral or written quiz on fur pieces and pelts.

MODULE OF INSTRUCTION

Title - WILDLIFE DISEASE AND PEST CONTROL Code - 01.0604-04

RESOURCE MATERIALS

A. Books - Game Biology and Game Management Lab. Manual by H.J. Stains
Department of Zoology, South Illinois University
Carbondale Burgess Publishing Company

B. Bulletins - Art of Trapping, New York D.E.C.
Furbearers of North Dakota, North Dakota
Department of Fish and Game

From Lab Manual
H J Stains
Deparment of Zoology
So. Illinois University, Carbondale

CAUSE OF DEATH, NECROPSY, AND PARASITE EXAMINATION
Objective #3

When examining an animal for the cause of death, three steps should be taken. First, examine the surroundings where the death occurred; second, examine the body of the animal; and last, perform a necropsy examination. When handling dead or sick animals it always is best to wear gloves.

The SURROUNDINGS often will provide clues to the cause of death. Look for sign of a struggle, tracks, hair or feathers, or sign of regurgitation and/or diarrhea (loose feces). Also note the general condition and the surrounding environment; sign of recent flood, condition and types of plants present, presence of utility lines, and other forms of life such as birds, insects, or fish found dead in the same area. Take extensive notes.

The BODY of the animal should be examined for gun shot wounds, tooth or talon marks of a predator, missing parts, broken bones or bruises, how the animal was opened if fed upon, whether there are strips of cooked meat or singed hair or feathers, and the general condition of the fur or feathers. If no external evidences are found, death probably is due to physiological or pathological reasons and an internal examination is necessary. Before the internal examination is made, the weight and size of the animal should be recorded; the condition of the eyes, bill, legs, and ears checked; and any external sores, growths, mange, or swellings noted. Check particularly the ears and upper inner leg region of mammals for ticks and look for fleas. Look for lice and mites on birds. Collect these parasites and try to estimate the numbers present. Seventy percent alcohol (or even rubbing alcohol) is a good preservative in which these parasites may be saved. Loss of weight, poorly kept pelage or plumage, especially if badly soiled with feces, indicates a poor condition of health and diarrhea.

The NECROPSY, if done completely, is a long involved process and one for the trained diagnostician. In the field, the game biologist probably will not have time to make such an examination. The larger organs and the general internal condition of the animal can be noted, however, without too great an effort. Always use gloves when examining the internal organs as a diseased animal may possess transmittable organisms. Skin the animal, bird or mammal, and check the inside of the skin for wound or gunshot marks. Look for and note the location of any blood clots just under the skin, this indicates some type of blow. If rabies is suspected cut off the head for later laboratory tests and place in an ice box or in any cool place so that bacterial action does not begin. The department of health in your state will probably be interested in making further examinations if you provide them with the materials.

Open the abdominal and chest cavities. Note all the organs and membranes, looking especially for inflammation, unnatural colorations, or spotting of such organs as the liver. Note the presence or absence of fat in regions such as the heart, around the intestines, kidneys, and under the skin.

Remove the entire digestive tract, tying off each region by a string so that the contents will remain separate, and examine the digestive tract, region by region. Slit each region separately and wash the contents out into a small white flat pan which has half of the bottom painted black so that white worms will show up readily. Place any worms found in 10 percent formalin (1 part formalin in 9 parts of water). Trematodes and cestodes are best killed in hot Bouin's picro-formol before placing in formalin. Look for lead shot in the gizzard of waterfowl. Make a fecal slide for later examination in the laboratory.

Examine the liver, lungs, and heart. Feel these organs for hard spots. Remove any such areas found and place them in 10 percent formalin to be examined later for the presence of tapeworm cysts. Follow the major vessels (blood in liver and heart, bronchi and bronchioles in lungs, bile duct in liver) with scissors, opening as you go. Place any worms found in preservative. The presence of large clots in the blood vessels indicates a circulatory stoppage which may have resulted in a heart attack. Check the female reproductive tract for possible pregnancy troubles and note reproductive condition of females.

If time permits, examine the brain for any unnatural conditions and check the sinuses around the eyes for the presence of worms (often found in mustelids).

If the animal has died recently or is killed by the investigator, the blood should be examined. Place two separate drops of blood secured from the heart or aorta on a slide. Quickly, before clotting, one drop should be spread thinly by touching it with the edge of another slide and drawing it away to spread the blood in a thin smear. Make at least two such slides and mark them with identifying numbers. These can be returned to the laboratory for staining and microscopical examination for protozoan and larval nematode parasites in the blood. Samples of blood also may be taken for possible bacterial infection if facilities are available for analysis. Sometimes poisoning may be suspected and, if so, samples of the stomach contents should be saved in weak formalin or, better still, kept in a refrigerator for later analysis.

Below are a few clues to the possible cause of death. Most specimens which have been sick for some length of time will appear emaciated.

1. MECHANICAL DAMAGE - broken bones and heavy bruises; blood clots under skin; found near cliff, pole, or highway; spines of seeds or spines of caterpillars found to puncture crop or food canals.

2. DROWNING - water in lungs.

3. ELECTROCUTION - meat cooked or strips cooked often with seared fur or feathers; found below power line; mouth, tongue, or lips burned.

4. SHOT - presence of small circular wound on one side and large torn-out area on other.

5. LEAD POISONING - large amount of shot in stomach or gizzard, bird showing signs of starvation.

6. PREDATOR - talon or tooth marks, parts missing, signs of a struggle.

7. STARVATION - empty intestinal tract, light in weight.
    BIRDS - thin breast muscles
    MAMMALS - absence of fat in coelomic cavity
    DEER - bone marrow red to yellow, soft and watery not white, solid and waxy.

8. PNEUMONIA - blood shot lungs and presence of mucous, presence of lesions in lungs.

9. HEART FAILURE - presence of large clot in major blood vessel, rupture of blood vessels surrounding heart.

10. PARASITIC WORMS - presence of large number of worms causing blockage of blood or digestive vessels, numerous lesions in vicinity of worms, loss of weight, poor condition of coat. Blood in urine of mountain goats (lungworm).

11. POISON - several kinds of dead animals in vicinity.

12. SNAKE BITE - fang marks present, may be oozing of blood from puncture, large swelling around wound.

13. WOUND INFECTION - scabs and large pus areas, enlargement of lymph glands.

14. HYPER-ACTIVITY - extreme enlargement of glands such as the thyroid, thymus, and pituitary.

15. ENTERITIS - hemorrhaged intestines and puffy mucous membrancs, blood in feces.

16. BOTULISM - usually no lesions, limber neck, feathers come out easily, stagnate water.

17. TULAREMIA - small white spots on liver, spleen, lung, kidney, or in lymph nodes; spleen greatly enlarged.

18. BACTERIAL INFECTION - inflamed appearance of kidneys or liver, inflammation of the peritoneum.

19. METRITIS - Acute or chronic inflammation of uterus caused by retention of fetal membranes, hemorrhage, a dead fetus.

20. COCCIDIOSIS- bloody diarrhea, gross lesions of intestine, coccidia in fecal slide.

21. DYSENTERY - bloody diarrhea, inflammation of large intestine, dehydration, loss of weight, amoeboid organisms in fecal slide.

22. DIARRHEA - numerous causes producing an excessive flow of runny fecal material.

23. FOOT - and - MOUTH DISEASE - inflammation of mouth, swellings and open sores on feet.

24. ANTHRAX - bloody anus and nostrils, decay takes place rapidly and accompanied by bloating; blood fails to clot readily and is darker than normal; rigor mortis absent; hemorrhages under skin common; spleen usually enlarged, dark, and soft; kidneys, liver, and lymph nodes enlarged. If seen alive, animal dies quickly with little sign of illness before; dying with a staggering, gasping, trembling collapse.

25. TUBERCULOSIS - emaciated, lesions in lungs of mammals and in intestinal wall, liver, and spleen of birds.

26. HISTOPLASMOSIS - enlarged bronchial lymph nodes and nodules in lungs, dysentery may be present because of ulcers of gastro-intestinal mucosa, emaciated.

27. MANGE - lesions on head, neck, shoulders, and any area where hair is short; loss of hair; formation of crusty scales; presence of mites in crusts.

28. POX - lesions on muzzle, inside lips, anus, teats or other bare areas in mammals and lesions on legs or face of birds.

29. SCALY LEG MITE OR BIRDS - loss of claws and distortion of legs.

30. DISTEMPER - animal, if alive, appears stupid and extremely tame, discharge from eyes and sometimes matted closed, mucous membrances red and inflamed, spleen may be enlarged, lungs may show a grayish-red mottling and feel like dough, often accompanied by diarrhea and convulsions.

31. RABIES - animal, if alive, appears crazy and aggressive or even sluggish and afraid, foaming at mouth, if dead, ground may be torn up by antics of animal; Negri bodies can be found in brain by those organizations equipped to make the proper examination.

32. CANCER OR TUMORS - any unusual growths, nodules or swellings.

33. UREMIC POISONING - abdominal cavity lined with uric acid.

Sometimes, and perhaps most frequently, death is due to a combination of factors, no one factor alone being the actual cause of death; near starvation combined with a large number of parasites, for example. In addition, diagnosis is not as simple as indicated above for often several maladies are accompanied by similar symptoms.

LAB EXERCISE ON CAUSE OF DEATH

This exercise may be conducted in one of several ways. Your lab instructor may have kept any animals found dead that were turned into him. If not, you may examine a number of collected specimens (such as those trapped in Exercise 8) or examine laboratory rats to learn the techniques described in this exercise. Preserve all parasites found. This laboratory may be combined with the study of the reproductive tracts (Exercise 10) if you have not had the opportunity to do that exercise.

If time permits, you may take an overnight trip, set mouse traps, camp out, and do a necropsy of the mice caught. Set the traps in several habitats and determine the number of parasites found in the same species of mice which were taken in different habitats. Did you find a difference? Which habitat or habitats contained the most heavily infected mice? Which species of mice were the most heavily parasitized?

The techniques used on these mice are the same as those which would be used on any mammalian game species.

MODULE OF INSTRUCTION

Title - STREAM MANAGEMENT

Code - 01.0605-01

DESCRIPTION:

The students will be able to analyze a stream as to its carrying capacity and water characteristics. Many of the aquatic organisms found in the stream will be studied in light of their relationship to the fish population of the stream. They will select material and build stream bank improvement structures and help plan the location of these structures. Students will learn how and where to get the necessary permits and permission to build stream improvement structures and where their local fisheries men are located.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Determining the carrying capacity of a stream	2	4
2. Determining structures for stream management	1	3
3. Construction of a stream improvement structure		12
4. Other stream improvement practices	1	7
	4	26

Revised June, 1974

MODULE OF INSTRUCTION

Title - STREAM MANAGEMENT Code - 01.0605-01

OBJECTIVES to be obtained:

The student will be able to:

1. Identify and list the factors which contribute to the carrying capacity of a stream.
2. Identify all major stream improvement structures and practices and predict their usefulness on a given stream.
3. Evaluate a section of unimproved stream and recommend needed improvements.
4. Plan for and construct one or more stream improvement structures.
5. Identify the equipment to be used for a stream improvement structure, and operate equipment safely and correctly on the construction of a structure.

Code - 01.0605-01

Title - STREAM MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
Unit 1. Determining the Carrying Capacity of a Stream Objective 1. Identify and list the factors which contribute to the carrying capacity of a stream.	A. What are the factors contributing to carrying capacity of a stream? . Food supply . Cover . Chemical properties of stream . Temperature . Oxygen . Volume . Spawning habitat . Year around flow . Fish species present . Levels of pollution B. What is the population level? . Shocking technique . Other population census data C. What are the limiting factors in this stream? . Analyze conditions . riffle area . pool area . undercurrent . Fish harvest . Bottom composition . Erosion D. How can this stream be improved or maintained? . Stream improvement structures . Augmented flows
Unit 2. Determining Structures for Stream Management Objective 2. Identify all major stream improvement practices and structures and predict their usefulness on a given stream.	A. What are the structures that can be used to improve stream? . Dams . Deflectors . Bank cribbing . Fencing . Tree cover . Pool diggers

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Discussion Field trip Demonstrations--use of equipment Graphs Charts Samples Consultants - Fishery biologist to direct students in technique for "electro-fishing" a stream	Pupil observation of the properties which control the capacity of the stream to hold fish. Student will actually participate in shocking operation. Compile data using fisheries data collecting card. Record results. Student will then determine the factors which limit population of fish. Have fisheries biologist also cite factors. Compare.	Evaluate student's judgment in determining limiting factors.
Discussion Handouts Charts Drawings--Plans of construction Field trip Bulletins	On visit to an improved stream student will identify the different types of structures and practices used for stream improvement. Student should take special note of how they were constructed.	

OBJECTIVES BY UNIT	CONTENT
Unit 2. (cont'd) Objective 3. Evaluate a section of unimproved stream and recommend needed improvements.	
Unit 3. Construction of a Stream Improvement Structure Objective 4. Plan for and construct one or more stream improvement structures. Objective 5. Identify the equipment to be used for a stream improvement structure and operate equipment safely and correctly on the construction of a structure.	A. Materials needed for construction . Logs . Poles . Boards . Rocks . Wire mesh . Gravel . Logs B. Construction method . Equipment needed . Steps in construction
Unit 4. Other Stream Improvement Practices	A. Correcting the course of a stream . Often caused by flooding B. Stream bank plantings for . Bank stabilization . Cover over stream

EDUCATION

01.0605-01 - Code

STREAM MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
	Student visit to an unimproved section of stream to recommend needed improvements. Student will prepare a plan including maps and diagrams to indicate placement and size of needed structures. Hand in.	Evaluate plan
Field discussion Bulletins on different structures Field exercise	Class decides on one or two structures to be constructed during module period. Student teams assigned to draw up plans for structure(s). Include in plan list of materials needed, equipment needed, steps in construction and working drawing of structure Class will participate in construction of structure(s) using tools and equipment (if qualified to operate) and materials needed.	Evaluate plan
Field lecture Field exercise	Students observe the action of flooding on the bed of a stream. Recommend how a stream can be brought back to original channels. (Actual re-channelling is probably better done in an equipment module) Student plans for and participates in stream bank plantings. Plan should include placement, species used, and methods of planting. Map will be included.	Evaluate plan

RESOURCE MATERIALS

Books -

The Conservationist, Ed. April - May 1968. Page 20 - Life on a Stream Bottom.

Bulletins -

Information Leaflets, New York State Conservation Department
  Guide to Stream Improvement
  Trout Food in Streams
  Build a Log Pyramid Pool Digger
  Fishery Management
  Stream Improvement in Miniature

Periodicals -

Morgan, Field Book of Ponds and Streams, Putnam

Odum, Fundamentals of Ecology, W. B. Saunde[illegible]mpany, Philadelphia

Fish Conservation Fundamentals, Sport Fishing Institute, Bond Building, Washington, D. C.

MODULE OF INSTRUCTION

Title - WATER AND SEWAGE SYSTEMS Code - 01.0605-02

DESCRIPTION:

The students will make an inventory of the water needs of a recreational facility or farm within their area and compute its requirements in line with existing consumption tables. They will learn the different sources of water impurities and how they can be removed from the water. The different types of pumps will be examined for both maintenance and repair purposes. Students will learn plumbing techniques, how to make pipe installations in steel, copper, and plastic, and when to use each type. The newest types of sewage holding tanks and disposal fields will also be examined.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Water System Planning	2	
2. Sources of Water	1	
3. Providing Safe Water		6
4. Improving Water Quality	1	
5. Water Pumps, use and maintenance	2	8
6. Steel, copper and plastic pipe installation		4
7. Sewage Holding Tanks	1	2
8. Sewage Disposal Fields	1	2
	8	22

Revised June, 1974

MODULE OF INSTRUCTION

Title - WATER AND SEWAGE SYSTEMS

Code - 01.0605-02

OBJECTIVES to be obtained:

The student will be able to:

1. Itemize the necessary considerations to adequately plan a water system.
2. Make an analysis of local sources of water.
3. Find means to protect water sources from contamination.
4. State one method to use to improve water quality in each of the following problem situations:
    - Water hardness
    - Iron control
    - Acid control
    - Off flavor
    - Turbidity
5. Through understanding of pump concepts, diagram accurately, on work study sheets, the flow of water in:
    - piston pumps
    - helical-rotor
    - straight and submersible centrifugal
    - turbine
    - centrifugal - jet
6. Join pipe sections of steel, copper, and plastic to withstand water pressure of 40 p.s.i.
7. Study the absorption qualities of given soils; coarse sand or gravel, fine sand, sandy loam or sand clay, clay or considerable sand or gravel, and heavy clay, using a predetermined field testing technique.
8. Utilizing absorption quality criteria, calculate (from tables) the square feet of disposal field needed for a 2-3 bedroom home.

Code - 01.0605-02

Title · WATER AND SEWAGE SYSTEMS

OBJECTIVES BY UNIT	CONTENT
1. Water System Planning 1. The student will itemize the necessary considerations to adequately plan a water system.	A. Water system components . Pump . Tank . Pipe . Electric power or stationary engine . Water source B. Quantity of water needed . Water system for home . Water system for farm livestock, etc. . Water system for recreation area, golf course, etc.
2. Sources of Water 2. The student will make an analysis of local water sources.	Water sources A. Wells . Drilled wells . drilling rigs . rotary . percussion . well casing . Driven wells . point and screen . drive pipe and couplings . drive cap . Dug wells . casing B. Springs . Yield capacity C. Cisterns . Runoff area . Tank size D. Ponds

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Instructor will discuss the planning and the mechanics of water systems	The student will study water use tables and pump capacity charts in the planning process. Students using consumption table will calculate daily water needs for his own family Consumption Table (Daily Ave.) Home - 80 gal/person Livestock - Dairy cow - 20 gal. Hog - 4 gal. Chickens - 69 gal. per 100 birds Other - lawn watering to 1.1 in. 625 gal/1000 sq. ft. - Flushing Barn, Etc. 30-50 gal	The student will be given a specific water requirement problem and his computations and procedure in solving the problem will be graded by the instructor.
Chalk talk discussion Films Field trips	Field trip to observe well drilling rig in action. Lab calculation of roof area with annual rainfall to determine yearly volume of water available. This will determine size of cistern (see reference) Assemble driven well components in lab. Field trip to observe dug wells. Where possible, put on a pump and calculate drawdown to determine capacity (see reference) Field trip to small spring to check flow capacity by overflow method (see reference)	Students will take a written test on water sources, volume and capacity computations and well drilling equipment.

Code - 01.0605-02

AGRICULTURAL

Title - WATER AND SEWAGE SYSTEMS

OBJECTIVES BY UNIT	CONTENT
3. Providing Safe Water 3. The student will find means to protect water sources from contamination.	A. Protecting source from contamination . Underground . Surface . Testing . collecting sample B. Minimum distances from contaminated sources C. Disinfecting contaminated water . Chlorinators . injector type . pump . chlorine
4. Improving Water Quality 4. The student will be able to state one method to use to improve water quality in each of the following problem situations: . Water hardness . Iron control . Acid control . Off flavor . Turbidity	A. Hardness . Causes . Water softeners B. Iron . Dissolved iron . Bacterial action . toilet tank check . Control . water softeners C. Acidity . Usual cause . Neutralizing D. Off flavor . Causes . Correction . carbon filter E. Turbidity . Causes . Control . filter

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk talk Films Field trips Laboratory exercises	Collect water samples for testing, in lab. following prescribed procedure . Sterilizing faucet . Sterile bottle collection . Label and send to state health office Field trip to recreation area, etc. and observe chlorinator hookup and discuss state regulations on health codes	Will be included in oral and written discussion of the topic
Films Chalk talk Laboratory exercise	Lab exercises in passing pre-tasted water (with taste additives) samples through a carbon filter, then retaste sample Pass turbid water through a filter and show results Check local plumbing fixtures for redness or slime (iron) or green (acid) stains. Students report results	The student will be tested on water quality problems and their solutions

Code - 01.0605-02

Title - WATER AND SEWAGE SYSTEMS

OBJECTIVES BY UNIT	CONTENT
5. Water Pumps, Use and Maintenance 5. The students will diagram the following types of pumps showing parts and flow of water: piston pump helical rotor pump straight and submersible centrifugal pump turbine pump centrifugal jet pump	A. Types of Pumps . Piston Pump . major use . major parts . cylinder . plunger . check valves . water flow . Helical-rotor pump . parts . shaft . rubber sleeve . water flow . Straight and submersible centrifugal pump . parts . impellor . shaft . particular usage . types . water flow . Turbine pump . parts . staged impellors . water flow . Centrifugal jet pump . parts . jet . diffusor
6. Steel, Copper and Plastic pipe installation 6. The student will be able to join pipe sections of steel, copper, and plastic which he will test at 40 p.s.i. water pressure	A. Types of common pipe . Steel . advantages and disadvantages . Copper . advantages and disadvantages . hard and soft copper . Plastic . rigid and soft . advantages and disadvantages . Joining steel . cutting . cleaning . threading . compound . connecting . Joining copper . cutting . cleaning . flux . soldering . Joining plastic . cutting . solvent or clamping . joining and tightening

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk talk Films Demonstrations of pump characteristics Laboratory exercises Field trips	Field trip to observe as many pump type operations as possible Lab - students disassemble impeller type pump Lab - students set up a simple jet pump by: A. filling large pan with water B. running hose with nozzle into pan and into large pipe which is on an incline (one end in water and one end out) C. turn on water and note water flow from large pipe D. compare with that actually coming from hose	The student will be questioned during his lab work on the pump, parts, operation and characteristics
Films Chalk talk Demonstrations by instructor Laboratory exercises	The student works on the related laboratory exercises using proper tools and testing equipment	The students work on pipe and piping will be graded by the instructor

Code - 01.0605-02

AGRICULTURAL

Title - WATER AND SEWAGE SYSTEMS

OBJECTIVES BY UNIT	CONTENT
7. Sewage Holding Tanks 7. The student will study the absorption qualities of the following soil types: coarse sand or gravel fine sand sandy loam or sand clay heavy clay using a predetermined field testing technique	A. Sewage System Components and Function . Holding tank . Disposal Field B. Holding Tanks . Septic tank . round upright . flat . Cement block . Poured concrete C. Installation of septic tank . Relation of inlet to outlet . Leveling . Placement . Covering . Depth of tank D. Installation of sewage line to tank . Cleaning . Distance E. Tank "working" . Reasons for slowdown . climate . bacteria kills . Activation . System separation . laundry . toilets . etc.
8. Sewage Disposal Fields 8. Utilizing absorption quality criteria, the student will calculate from tables the square feet of disposal field needed for a 2-3 bedroom home.	A. Function of Disposal Field B. Soil type relation to absorption . Coarse sand or gravel . Heavy clay C. Soil absorption field test D. Absorption relation to size of drain field E. Installation of drain field . Perforated pipe . Distribution box . Dry well

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Chalk talk Field trip	Field trip to septic tank sales operation and to see or to participate in a tank installation. Laboratory exercise - construct a "mini-tank" from a barrel - cut out inlet and outlet at prescribed heights. Use plastic pipe as inlet pipe and install.	Evaluation of this area will be included in wrap-up testing of the whole module.
Chalk talk Field exercises Lab exercises	Using an absorption table (see books) calculate the rate of absorption and calculate square feet of drain field needed for a 3 bedroom home. Field trip to observe drain field installation OR Participate when possible in drain field construction	Evaluation of this area will be included in total evaluation by written test

MODULE OF INSTRUCTION

Title - WATER AND SEWAGE SYSTEMS Code - 01.0605-02

RESOURCE MATERIALS

A. BOOKS -

How to Install Plumbing - Sears RoeBuck and Co.

Planning Water Systems for Farm and Home
Engineering and Vocational Agriculture
Athens, Georgia

B. AUDIOVISUALS -

Planning Water Systems for Farm and Home
Script and Film Strip
American Association for Agricultural Engineering and
Vocational Agriculture
Athens, Georgia

MODULE OF INSTRUCTION

Title - COLLECTION OF WATER SAMPLES Code - 01.0605-03

DESCRIPTION:

This module provides instruction and experience in the collection of water samples from streams, sewers, and sewage treatment plants. The student will make an area reconnaissance, select sampling points, collect grab samples, and prepare composite samples in accordance with flow data. The majority of the class time will be spent on site at the three different sampling areas.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Importance of Sample Collection	2	-
2. Collection of Samples at a sewage treatment plant	-	10
3. Collection of samples from a sewer.	-	10
4. Collection of Samples from a stream.	—	8
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - COLLECTION OF WATER SAMPLES Code - 01.0605-03

OBJECTIVES to be obtained:

The student will be able to:

1. Recognize and understand the importance of collecting samples from sewage treatment plants, sewers, and streams.
2. Prepare for and collect samples at a sewage treatment plant.
3. Prepare for and collect samples from a sewer.
4. Prepare for and collect samples from a surface stream.

Code - 01.0605-03

AGRICULTURAL

Title - COLLECTION OF WATER SAMPLES

OBJECTIVES BY UNIT	CONTENT
Unit 1. Importance of Sample Collection Objective #1 Recognize and understand the importance of collecting samples from sewage treatment plants, sewers, and streams.	A. Representative aliquot of a larger body. B. The quality of the sample collected relates to the team communication. C. The method of sample collection may be subject to legal questioning.
Unit 2. Collection of Samples at a sewage treatment plant. Objective #2. Prepare for and collect samples at a sewage treatment plant.	A. Preparation for sample collection . Area reconnaissance . Preparation of area sketch . Attention to safety aspects . Use of sampling equipment . Preparation and labeling of sample containers . Preparation of data sheets B. Sample collection . Collection of a grab sample at sewage treatment plant primary settling tank. . Transfer sample to container . Acid preservation of a sample aliquot . Sealing of sample containers . Storage of samples . Collection of samples for compositing . Reading and recording of flow data . Preparation of composite samples in accordance with flow data. . Transportation of samples.

E D U C A T I O N	01.0605-03	- Code
	COLLECTION OF WATER SAMPLES	- Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 1 - Objective #1. The Teacher will use 35mm slide Cartoon drawings and pictures to demonstrate the importance of sample collection.	Observe Teacher	Oral test
Unit 2. - Objective #2. A. The teacher will conduct the students on a tour of a sewage treatment plant and point out the most important functional areas. B. The teacher will prepare a quick area sketch for the student while on site. C. The teacher will explain safety awareness. D. Teacher demonstration of preparation of containers, data sheets, and use of equipment. E. Teacher demonstration of sample collection and handling.	A. Observe teacher B. Duplicate preparation procedures as demonstrated by the teacher. C. Duplicate collection and handling procedures as demonstrated by the teacher.	Check list of field performance by students.

Code - 01.0605-03

A G R I C U L T U R A L

Title - COLLECTION OF WATER SAMPLES

OBJECTIVES BY UNIT	CONTENT
Unit 3. Collection of samples from a sewer. Objective #3. Prepare for and collect samples from a sewer.	A. Preparation for sample collection . Area reconnaissance . Preparation of area sketch . Removal and replacement of manhole covers . Erection of safety barriers . Use of sampling equipment . Preparation and labeling of sample containers . Preparation of data sheets B. Sample collection . Collection of a grab sample at sewage treatment plant primary settling tank. . Transfer sample to container . Acid preservation of a sample aliquot. . Sealing of sample containers . Storage of samples . Collection of samples for compositing . Reading and recording of flow data . Preparation of composite samples in accordance with flow data. . Transportation of samples.
Objective #4. - Prepare for and collect samples from a surface stream. Unit 4. Collection of samples from a stream.	A. Preparation for sample collection . Area reconnaissance . Preparation of area sketch . Safety aspects connected with getting to sampling site. . Utilization of life vest . Use of proper footwear. . Use of sampling equipment . Preparation and labeling of sample containers. . Preparation of data sheets. B. Collection of samples . Collection of grab samples at different stream depths. . Collection of grab samples at varying distances from the stream bank. . Collection of composite samples. . Sample transfer, preservation, sealing, and transportation. (same as Unit II).

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 3. - Objective #3. A. The teacher will demonstrate the technique used in making an area reconnaissance at a sewer manhole site. B. The teacher will demonstrate the techniques of safety by erecting a safety barrier and removing a manhole cover at the site. C. Teacher demonstration of collection of grab and composite samples.	A. Observe teacher B. Duplicate preparation procedures as demonstrated by the teacher. C. Duplicate collection and handling procedures as demonstrated by the teacher.	Check list of field performance by students.
Unit 4. - Objective #4. A. The teacher will select a suitable area stream for demonstration of sampling. B. The teacher will use artistic drawings on site to demonstrate safety aspects. C. The teacher will demonstrate the proper method of sample collection and handling via actual collection.	A. Observe teacher B. Duplicate preparation procedures as demonstated by the teacher. C. Duplicate collection and handling procedures as demonstrated by the teacher.	Check list of field performance by students.

MODULE OF INSTRUCTION

Title - COLLECTION OF WATER SAMPLES Code - 01.0605-03

RESOURCE MATERIALS

A. Reference books and bulletins -

1. Industrial Wastewater discharges: Flow measurement, sampling, analysis.

   Available from State of New York, Health Education Services, P.O. Box 7283, Albany, New York 12224.

   (Price ranges from $1.00 each for small lots to $10.35 each for lots of 100 or more).

2. Standard Methods for the Examination of Water and Wastewater. APHA, AWWA, WPCF. 13th edition (1971).

   Available from the Water Pollution Control Federation, 3900 Wisconsin Avenue, Washington, D.C. 20016. ($22.50)

B. Audiovisuals -

The 35 mm slides can be prepared by any photography processing shop upon the submission of artist sketches to be photographed.
One such supply shop is:

Northeast Color Lab
551 Paige Street
Schenectady, New York

(Approx cost: 1st time $5/slide; Additional, $1/slide)

MODULE OF INSTRUCTION

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I) Code - 01.0605-04

DESCRIPTION:

This module provides instruction and experience in the analysis of water and wastewater samples by standard methods accepted and utilized by the profession. The student will receive instruction in laboratory safety, definition of metric units for weight and volume measures, and the basic operation of laboratory instrumentation such as an analytical balance, pH meter, and muffle furnace. The student will analyze water and wastewater samples for pH, total solids, suspended solids, turbidity, and color. The majority of the class time will be spent in a laboratory.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Familiarization of laboratory safety aspects and terminology	1	3
2. Use of basic laboratory equipment	-	6
3. Determination of pH in a water sample	-	4
4. Determination of total solids concentration in water samples	-	6
5. Determination of suspended solids concentration in water samples	-	6
6. Determination of turbidity in water samples	-	2
7. Determination of color in water samples	-	2
	1	29

Revised June, 1974

MODULE OF INSTRUCTION

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I)   Code - 01.0605-04

OBJECTIVES to be obtained:

The student will be able to:

1. Understand and practice laboratory safety procedures to prevent burning from fire or chemicals, cutting from glassware and shock from electrical equipment.
2. Convert English weight and volume units to the metric equivalents for use in laboratory terminology.
3. Operate an analytical balance, pH meter, muffle furnace, and propipetor.
4. Analyze water samples for pH values.
5. Analyze water samples for total solids and corresponding volatile fraction.
6. Analyze water samples for suspended solids and corresponding volatile fraction.
7. Analyze water samples for turbidity.
8. Analyze water samples for color.

Code - 01.0605-04

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I)

OBJECTIVES BY UNIT	CONTENT
Unit 1. - Familiarization of laboratory safety aspects and terminology. Objective #1. Understand and practice laboratory safety procedures to prevent burning from fire or chemicals, cutting from glassware and shock from electrical equipment. Objective #2. Convert English weight and volume units to the metric equivalents for use in laboratory terminology.	A. Laboratory safety procedure . Prevention of burning by fire . Prevention of burning by chemicals . Prevention of cutting from glassware . Protection against electrical shock B. Conversion of English units to metric units . Weight measure . Volume measure
Unit 2. - Use of basic laboratory equipment. Objective #3. Operate an analytical balance, pH meter, muffle furnace, and propipetor.	A. Operation of analytical balance . Basic operating features . Weighing of three different materials B. Operation of pH meter . Basic operating features . Standardization of meter . Reading of pH value C. Operation of muffle furnace . Basic operating features . Transfer of material into and out of furnace D. Operation of a propipetor . Basic operation . Transfer of liquids

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will use 35 mm slide cartoon drawings and pictures to demonstrate safety procedures. B. The teacher will demonstrate faucet washing, eye wash unit, safety shower, and fire blanket. C. The teacher will use slides to demonstrate conversion factors. D. The teacher will demonstrate method of reading graduated cylinders, pipets and beakers.	Observe Teacher Convert a list of English values to metric units and vice versa.	Oral test Evaluation of correctness of paper work.
A. The teacher will demonstrate how to use an analytical balance by weighing a coin. B. The teacher will demonstrate the proper use of a pH meter. C. The teacher will demonstrate the use of a muffle furnace. D. The teacher will demonstrate the use of a propipetor.	The student will observe teacher and then duplicate procedures by operating each piece of laboratory instrumentation.	Checklist of operation performance for each piece of equipment.

Code - 01.0605-04

AGRICULTURAL

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I)

OBJECTIVES BY UNIT	CONTENT
Unit 3. - Determination of pH in a water sample Objective #4. Analyze water samples for pH values.	A. Determine pH with electrical meter . Meter standardization . Determination of pH in three standard samples . Determination of pH in an unknown sample. B. Determine pH by a colorimetric method. . Use of comparator disc . Determination of pH in three standard samples . Determination of pH in an unknown sample.
Unit 4. - Determination of total solids concentration in water samples Objective #5. Analyze water samples for total solids and corresponding volatile fraction.	A. Determine tare weight of dish. B. Transfer of homogenous sample aliquot to tared dish. C. Evaporation in oven D. Transfer to dessicator E. Determine weight of residue plus dish F. Calculation of final value in units of mg/l. G. Ignition of volatile fraction in muffle furnace. H. Transfer to dessicator. I. Determination of residue plus dish. J. Calculation of volatile solids content.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will demonstrate the analysis of a water sample for pH by use of a pH meter. B. The teacher will analyze a water sample for the students by using a color comparator unit.	The student will observe the teacher and then determine the pH of three standard known samples and one unknown sample by both the pH meter and color comparator disc techniques.	The unknown sample value will be known by the teacher and thus the teacher can evaluate the performance of the student by his value obtained for the unknown sample.
The teacher will demonstrate each step in the procedure with the use of slides and actual practice.	The student will observe the teacher and then determine the total solids concentration and corresponding volatile value on two water samples, one "known" and one "unknown".	The teacher will evaluate the student's performance by comparing the values obtained for the unknown sample with the correct values.

Code - 01.0605-04

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I)

OBJECTIVES BY UNIT	CONTENT
Unit 5. - Determination of suspended solids concentration in water samples. Objective #6. Analyze water samples for suspended solids and corresponding volatile fraction.	A. Preparation of crucible plus paper. B. Determination of crucible tare weight. C. Placement of crucible in vacuum flash. D. Transfer of homogenous sample aliquot to crucible. E. Filter sample F. Dry crucible and contents in an oven at 110° centigrade. G. Transfer to dessicator H. Determine weight of crucible plus residue. I. Calculation of final value in units of mg/l. J. Transfer of crucible to muffle furnace. K. Ignition of volatile content. L. Transfer to dessicator M. Determination of weight of crucible plus residue. N. Calculation of volatile content and report in units of mg/l.
Unit 6. - Determination of turbidity in water samples. Objective #7. Analyze water samples for turbidity values.	A. Use of Jackson Candle turbidimeter . Set up of unit . Read values of three different water samples. . Record values in JTU units B. Use of Automatic Electrical turbidimeter . Standardization of unit . Read values of three different water samples. . Record values in JTU units.

ANALYSIS OF WATER AND WASTEWATER SAMPLES (I) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
The teacher will demonstrate each step in the procedure by 35 mm color slides and actual practice.	The student will observe the teacher and then duplicate the procedures for two water samples, one "known" and one "unknown" sample.	The teacher will evaluate the student's performance, by comparing the values obtained for the unknown sample with the correct values.
A. The teacher will demonstrate the use of a Jackson Candle turbidimeter by using it to analyze a water sample for turbidity. B. The teacher will demonstrate the use of an automatic electrical turbidimeter by using it to analyze a water sample for turbidity.	The student will observe the teacher and then duplicate the procedures for both a Jackson Candle turbidimeter and automatic electrical turbidimeter. The student will analyze two known water samples.	The teacher evaluate the student with a checklist of operation performance on both units.

Code - 01.0605-04

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I)

OBJECTIVES BY UNIT	CONTENT
Unit 7. - Determination of color in water samples. Objective #8. Analyze water samples for color.	A. Set up of standard color comparator tube solutions B. Comparsion of color on three water samples with standard tubes to determine reading.

EDUCATION 01.0605-04 - Code

ANALYSIS OF WATER AND WASTEWATER SAMPLES (I) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 7. - Objective #8. The teacher will demonstrate the analysis of a water sample for color.	The student will observe teacher, then repeat the procedures during the analysis of two water samples for "color".	The teacher will evaluate the student with a checklist of operation performance.

MODULE OF INSTRUCTION

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (I) Code - 01.0605-04

RESOURCE MATERIALS

A. Reference books and bulletins -

1. Standard Methods for the Examination of Water and Wastewater. APHA, AWWA, WPCF. 13th edition (1971)

   Available from the Water Pollution Control Federation, 3900 Wisconsin Avenue, Washington, D.C. 20016 ($22.50)

2. Procedures for the Analysis of Wastewater. - Author (J.L. Setser) (1970)

   Available from Environment/one Corporation at a cost of $3.00 per manual. 2773 Balltown Road, Schenectady, New York 12309.

B. Audiovisuals -

A series of 300 color 35 mm slides illustrating all steps in the analysis of water samples was prepared by Lauman Laboratories for the New York State Department of Health. Duplicates can probably be obtained.

MODULE OF INSTRUCTION

Title - **ANALYSIS OF WATER AND WASTEWATER SAMPLES (II)** Code -01.0605-05

DESCRIPTION:

This module provides instruction and experience in the analysis of water and wastewater samples by standard methods accepted and utilized by the profession. The student will analyze water and wastewater samples for chemical oxygen demand, biochemical oxygen demand, and dissolved oxygen. The student will continue his general familiarization with laboratory equipment as well as mathematical calculation of final values from raw laboratory data. The majority of the class time will be spent in a laboratory.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Review of laboratory safety	1	1
2. Determination of dissolved oxygen content in water samples.	1	5
3. Determination of 5-day biochemical oxygen demand content of water samples	1	12
4. Determination of the chemical oxygen demand content of water samples	1	8
	4	26

Revised June, 1974

MODULE OF INSTRUCTION

Title - **ANALYSIS OF WATER AND WASTEWATER SAMPLES (II)** Code - 01.0605-05

OBJECTIVES to be obtained:

The student will be able to:

1. Understand and reapply laboratory safety procedures previously learned in "Analysis of Water and Wastewater Samples (1)".

2. Analyze water samples for dissolved oxygen.

3. Analyze water samples for 5-day biochemical oxygen demand.

4. Analyze water samples for chemical oxygen demand.

Code - 01.0605-05

AGRICULTURAL

Title - **ANALYSIS OF WATER AND WASTEWATER SAMPLES (II)**

OBJECTIVES BY UNIT	CONTENT
Unit 1. - Review of laboratory safety. Objective #1. Understand and reapply laboratory safety procedures previously learned in "Analysis of Water and Wastewater Samples (I)".	A. Laboratory safety procedure . Prevention of burning by fire. . Prevention of burning by chemicals. . Prevention of cutting from glassware. . Protection against electrical shock.
Unit 2. Determination of dissolved oxygen content in water samples. Objective #2. Analyze water samples for dissolved oxygen.	A . Sample handling techniques B . Addition of manganous sulfate solution to sample. C . Addition of alkaline -azide-iodide solution to sample. D . Homogenous distribution of floc in sample. E . Dissolution of floc with sulfuric acid solution. F . Transfer of sample aliquot to titrating container. G . Addition of titrating agent to obtain straw color. H . Addition of starch solution I . Addition of titrating agent to colorless end point. J . Calculation of final value in units of mg/l from raw laboratory data.
Unit 3. - Determination of 5-day biochemical oxygen demand content of water samples. Objective #3. Analyze water samples for 5-day biochemical oxygen demand.	A. Definition of biochemical oxygen demand (BOD). B. Addition of different size sample aliquots to 300 milliliter BOD bottles. C. Addition of dilution water to sample aliquots. D. Sealing of bottles. E. Transfer of bottles to incubator F. Determination of dissolved oxygen content of dilution water. G. Removal of samples from incubator after five days. H. Determination of dissolved oxygen in samples after incubation. I. Calculation of final value as mg/l.

01.0605-05 - Code

- Title

ANALYSES OF WATER AND WASTEWATER SAMPLES (II)

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will use 35 mm slide cartoon drawings and pictures to demonstrate safety procedures. B. The teacher will demonstrate faucet washing, eye wash unit, safety shower, and fire blanket.	Observe teacher	Oral test
A. The teacher will demonstrate the procedures with the use of slides and actual performance.	A. Observe teacher B. Duplicate procedures demonstrated by teacher for two water samples.	Checklist of operation performance using proper techniques.
A. The teacher will demonstrate the procedures with the use of slides and actual performance.	A. Observe teacher B. Duplicate procedures demonstrated by teacher for three different sample aliquots of a sample of known value.	Checklist of operation performance using proper techniques. Evaluation based on obtaining a value for known sample close to correct value.

Title - ANALYSIS OF WATER AND WASTEWATER SAMPLES (II)

OBJECTIVES BY UNIT	CONTENT
Unit 4. - Determination of the chemical oxygen demand content of water samples Objective #4. Analyze water samples for chemical oxygen demand.	A. Transfer of varying sample aliquots to flasks. B. Addition of small amount of concentrated sulfuric acid. C. Addition of mercuric sulfate. D. Addition of silver sulfate E. Addition of sulfuric acid. F. Placement of flash on reflux apparatus. G. Reflux of sample. H. Washing down reflux unit. I. Removal of sample. J. Addition of ferrous indicator. K. Titration with ferrous ammonium sulfate solution to brown end point. L. Calculation of final values in units of mg/l from raw laboratory data.

ANALYSIS OF WATER AND WASTEWATER SAMPLES (II) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
1. The teacher will demonstrate each step in the procedure by actual performance.	A. Observe teacher B. Duplicate procedures demonstrated by teacher for three different sample aliquots of a sample of known value. Special Exception - The student will not transfer the final volume of concentrated sulfuric acid to the sample because of the danger. The teacher will do this step for the student. The student will perform all other steps in the procedure.	A. Checklist of operation performance using proper techniques. B. Evaluation based on obtaining a value for known sample close to correct value.

MODULE OF INSTRUCTION

Title - **ANALYSIS OF WATER AND WASTEWATER SAMPLES (II)** Code - 01.0605-05

RESOURCE MATERIALS

A. Reference Books and Bulletins -

1. Standard Methods for the Examination of Water and Wastewater. APHA, AWWA, WPCF., 13th edition (1971)

   Available from the Water Pollution Control Federation, 3900 Wisconsin Avenue, Washington, D.C. 20016 ($22.50)

2. Procedures for the Analysis of Wastewater - Author (J.L. Setser) (1970)

   Available from Environment/one Corporation at a cost of $3.00 per manual. 2773 Balltown Road, Schenectady, New York 12309

B. Audiovisuals -

A series of 300 color 35 mm slides illustrating all steps in the analysis of water samples was prepared by Lauman Laboratories for the New York State Department of Health. Duplicates can probably be obtained.

MODULE OF INSTRUCTION

Title - SEWAGE TREATMENT PLANT OPERATION (I) Code - 01.0605-06

DESCRIPTION:

This module provides instruction and experience in the general operation of a sewage treatment plant. The student will learn of the sources of sewage and its composition. He will receive instruction in treatment plant safety as well as the use of preliminary treatment such as bar screens, grit chambers, and communitors. The student will observe the operation and functioning of a primary settling tank and the activated sludge secondary.treatment step. The student will participate in the maintenance of both the primary and secondary treatment steps. The majority of the class time will be spent at a sewage treatment plant.

MAJOR DIVISIONS OR UNITS OF CONTENT	Class	Other
1. Introductory Principles of Sewage Treatment	2	2
2. Treatment Plant Safety	-	2
3. Preliminary Treatment	-	4
4. Primary Treatment Step	-	10
5. Use of Activated Sludge for Secondary Treatment	-	10
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - SEWAGE TREATMENT PLANT OPERATION (I)

Code - 01.0605-06

OBJECTIVES to be obtained:

The student will be able to:

1. Understand and draw a block diagram sketch of the basic principles of sewage production and treatment.
2. Understand and practice safety procedures at a sewage treatment plant.
3. Determine the location of bar screens, grit chambers and communitors and clean them in accordance with procedures accepted by the profession.
4. Recognize a primary settling tank by its geographical location and function.
5. Recognize a secondary treatment activated sludge system.
6. Make on site dissolved oxygen and settleable solids tests to determine how well the secondary process is functioning.

01.0605-06

AGRICULTURAL

Title - SEWAGE TREATMENT PLANT OPERATION (I)

OBJECTIVES BY UNIT	CONTENT
Unit 1. - Introductory Principles of Sewage Treatment Objective #1 - Understand and draw a block diagram sketch of the basic principles of sewage production and treatment.	A. Sources of Sewage Production . Human production . Household wastes B. Composition of Sewage . Solids . Water . Gases C. Types of Sewage Treatment . Preliminary treatment by bar screens, grit chambers and communitors. . Location and function of a primary settling tank . Secondary treatment by use of activated sludge. . Disinfection by chlorination
Unit 2. - Treatment Plant Safety Objective #2 - Understand and practice safety procedures at a sewage treatment plant.	A. Prevention of Physical Injuries . Manhole lifting . Protection against electricity . Ladders . Fire extinguishers B. Prevention of Body Infections . Cleaning, disinfection of cuts and scratches . Use of proper wearing apparel . Observation of drinking and eating habits

EDUCATION 01.0605-06 - Code

SEWAGE TREATMENT PLANT OPERATION (I) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will use cartoon drawings and diagrams to show the sources of sewage production. B. The teacher will present a bucket of raw sewage and explain its content. C. The teacher will show by use of a block diagram, the different basic steps in sewage treatment.	A. Observe Teacher. B. Prepare a block diagram of production and treatment of sewage.	A. Oral test B. Evaluation of completeness of drawing.
A. The teacher will conduct a tour through a sewage treatment plant and point out the dangers that cause physical injuries. B. The teacher will demonstrate the use of cleaning agents, wearing apparel, and the observation of good eating and drinking habits.	A. Observe teacher. B. Prepare a list of danger areas and safety procedures at a second treatment plant.	A. Evaluation of completeness of prepared lists by students.

OBJECTIVES BY UNIT	CONTENT
Unit 3. - Preliminary Treatment Objective #3 Determine the location of bar screens, grit chambers and communitors and clean them in accordance with procedures accepted by the profession.	A. Racks and Bar Screens • Location • Cleaning Procedures B. Grit Chambers • Location • Cleaning Procedures C. Communitors • Location • Maintenance
Unit 4. - Primary Treatment Step Objective #4 Recognize a primary settling tank by its geographical location and function.	A. Primary Settling Tank Description • Inlet • Baffles • Overall Dimensions • Detention Period • Settling Rate B. Efficiency of settling tank • Settleable Solids Test C. Maintenance of Settling Tank • Excess sludge and grease removal

EDUCATION

01.0605-06 - Code

SEWAGE TREATMENT PLANT OPERATION (I) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will point out the location of bar screens, grit chamber, and communitors at a sewage treatment plant. B. The teacher will demonstrate the proper method of cleaning.	A. Observe Teacher B. Reproduce procedures demonstrated by teacher.	A. Checklist of operation performance of procedures.
A. The teacher will point out and explain the features of the primary settling tank. B. The teacher will calculate the detention time and settling rate. C. The teacher will run a settleable solids test. D. Teacher demonstration.	A. Observe teacher. B. Prepare a rough diagram of a primary settling tank and list the principal features. C. Run a settleable solids test. D. Perform sludge and grease removal from a primary settling tank.	A. Evaluation of completeness of sketch. B. Evaluation by comparison of student value for settleable solids with teacher value. C. Checklist of operation performance of procedures.

01.0605-06

Title - **SEWAGE TREATMENT PLANT OPERATION (I)** **AGRICULTURAL**

OBJECTIVES BY UNIT	CONTENT
Unit 5. - Objective #5 Use of activated Sludge for Secondary Treatment Objective #5 Recognize a primary settling tank by its geographical location and function.	A. Initial character of activated sludge - • Physical character • Biological character B. Mixing the Activated Sludge with the Sewage to be treated. • Aeration • Return of sludge • Aeration time • Dissolved oxygen concentration
Objective #6 Make on site dissolved oxygen and settleable solids tests to determine how well the secondary process is functioning.	C. Separation of Activated Sludge from the mixed liquor • Secondary clarifier • Detention time • Settleable solids test

01.0605-06

EDUCATION - Code

SEWAGE TREATMENT PLANT OPERATION (I) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. The teacher will point out the physical character of a sewage sludge sample.	A. Observe Teacher demonstration.	Checklist of operation performance of procedures.
B. The teacher will phone the biological character of activated sludge by the use of a microscope.	B. Observe aeration and sludge return process and prepare a rough sketch.	
C. The teacher will point out the aeration and return sludge features of the sewage treatment plant.	C. Run a dissolved oxygen test.	
D. The teacher will measure the dissolved oxygen in the reaction tank.	D. Run a settleable solids test.	
E. The teacher will run a settleable solids test to demonstrate the separation of activated sludge from the mixed-liquor.		

MODULE OF INSTRUCTION

Title - SEWAGE TREATMENT PLANT OPERATION (I)   Code - 01.0605-06

RESOURCE MATERIALS

A. Reference Books and Bulletins -

1. Manual of Instruction for Sewage Treatment Plant Operators (prepared by New York State Department of Health).

   Available from Health Education Service, P.O. Box 7283, Albany, New York 12224 (approximately $5 per copy)

2. Standard Methods for the Examination of Water and Wastewater; APHA, AWWA, WPCF. 13th Ed. (1971)

   Available from the Water Pollution Control Federation, 3900 Wisconsin, Avenue, Washington, D.C. 20016 ($22.50)

B. Audiovisuals -

A series of cartoon drawings showing sources of sewage production and types of treatment should be made and transferred into 35 mm slides.

MODULE OF INSTRUCTION

Title - WATER TREATMENT PLANT OPERATION Code - 01.0605-07

DESCRIPTION:

This module provides instruction in water sources and water uses. Standards for drinking water are provided and the different methods of water treatment are demonstrated. The student will receive instruction in filtration, chlorination, and softening of a water supply source. The student will conduct a chemical analysis for chlorine residual and hardness parameters. The student will also receive instruction in basic treatment plant maintenance.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Introductory principles of water treatment	2	2
2. Water Treatment Plant Safety Aspects	-	2
3. Filtration	-	8
4. Chlorination	-	8
5. Softening	-	8
	2	28

Revised June, 1974

MODULE OF INSTRUCTION

Title - WATER TREATMENT PLANT OPERATION Code - 01.0605-07

OBJECTIVES to be obtained:

The student will be able to:

1. Understand and list the basic principles of water sources, uses, methods of treatment and standards.
2. Understand and practice water treatment plant safety procedures.
3. Remove suspended solids in a water source by the use of a pilot model rapid sand filter.
4. Understand and demonstrate the use of chlorine as a disinfecting agent at a water treatment plant by using a small scale pilot model.
5. Understand and demonstrate the softening of a water supply by using a small scale pilot facility.

Title - WATER TREATMENT PLANT OPERATION

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Introductory principles of Water Treatment Objective #1 Understand and list the basic principles of water sources, uses, methods of treatment and standards.	A. Water Sources . Surface Water . Ground Water B. Water Uses . Drinking . Washing Clothes . Bathing . Cooking C. Standards . Chemical . Biological D. Methods of Treatment . Sedimentation . Filtration . Chlorination . Softening . Aeration
Unit 2 - Water Treatment Plant Safety Aspects Objective #2 Understand and practice water treatment plant safety procedures.	A. Falls B.. Electric Shock C. Infections D. Dangerous Chemicals E. Inadequate help F. Cylinder handling
Unit 3 - Filtration Objective #3 Remove suspended solids in a water source by the use of a pilot model rapid sand filter.	A. Principles of Operation B. Rate Controller C. Filter backwashing D. Actual removal of suspended matter, by filtration as verified by the suspended solids test.

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 1 - Objective #1 A. The teacher will use 35 mm slides which contain drawings that represent sources of water and its uses. B. The teacher will use actual pictures (35 mm slides) of different process operations to demonstrate and show the different methods of treatment.	A. Observe Teacher B. Answer a series of multiple choice questions concerning the basic principles of water treatment.	Number of questions answered correctly concerning the principles of water source, water use, methods of treatment and standards.
Unit 2 - Objective #2 The teacher will demonstrate the correct safety procedures related to each subject area.	A. Observe teacher. B. Visit a water treatment plant and prepare a checklist of various safety procedures being used.	Completeness of the student prepared checklist.
Unit 3 - Objective #3 The teacher will demonstrate the removal of suspended matter by using a small portable high rate filtration (rapid sand filter) unit. The teacher will run a solids test before and after filtration.	A. Observe teacher. B. Reproduce procedures and tests demonstrated by teacher	A. Checklist of procedures followed by the student. B. Comparison of suspended solids value obtained by the student with that obtained by the teacher.

Title - WATER TREATMENT PLANT OPERATION

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Chlorination Objective #4 Understand and demonstrate the use of chlorine as a disinfecting agent at a water treatment plant by using a small scale pilot model.	A. Principles of chlorination B. Use of chlorine gas C. Use of hypochlorite D. Measurement of chlorine residual
Unit 5 - Softening Objective #5 Understand and demonstrate the softening of a water supply by using a small scale pilot facility.	A. Principles of Water Softening B. Chemical Precipitation C. Ion exhange D. Hardness test

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Unit 4 - Objective #4 A. The teacher will use the small pilot model to demonstrate the use of both chlorine gas and hypochlorite for disinfection. B. The teacher will run a chlorine residual test before and after disinfection.	A. Observe Teacher B. Reproduce procedures and tests demonstrated by teacher.	A. Checklist of procedures followed by the student. B. Comparison of test values obtained by the students with those obtained by the teacher.
Unit 5 - Objective #5 A. The teacher will use a small scale pilot unit to demonstrate the principles of water softening by the addition of lime. A hardness test will be run before and after softening. B. The teacher will repeat step - (1) using ion exchange media - a hardness test will be run before and after ion - exchange.	A. Observe Teacher B. Reproduce procedures and tests demonstrated by teacher.	A. Checklist of procedures followed by the student. B. Comparison of test values obtained by the students with those obtained by the teacher.

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MODULE OF INSTRUCTION

Title - WATER TREATMENT PLANT OPERATION Code - 01.0605-07

RESOURCE MATERIALS

A. Reference Books and Bulletins -

1. Manual of Instruction for Water Treatment Plant Operators (prepared by the New York State Department of Health).

   (Available from Health Education Service, P.O. Box 7283, Albany, New York, 12224 (Approximately $5 per copy).

2. Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WPCF, 13th Ed. (1971)

   Available from the Water Pollution Control Federation, 3900 Wisconsin Avenue, Washington, D.C. 20016 ($22.50)

B. Audiovisuals - a series of specially prepared 35 mm slides will have to be made to show basic principles of water treatment.

C. Pilot Test Unit - A small bench scale pilot unit will have to be fabricated as a custom item in a shop.

MODULE OF INSTRUCTION

Title - ATMOSPHERIC SAMPLING OF STACKS Code - 01.0606-01

DESCRIPTION:

This module provides instruction and experience in the sampling and analysis of particulate emissions from exhaust stacks. The student will be able to understand the importance of source emission sampling and its relationship to the processes which produce the particulate matter. The student will participate in the selection of a sampling point, performance of a flow measurement traverse and collection of a particulate sample from an exhaust stream. The majority of the class time will be spent in the special laboratory and in the field at an industrial plant location.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocation Class	Time Allocation Other
1. Introductory Discussion of Importance of Sampling of Stacks	2	-
2. Safety Aspects Concerned With Sampling Stacks	1	2
3. Preparation For Stack Sampling	-	6
4. Flow Measurement	-	8
5. Sampling for Particulate Emissions	2	9
	5	25

Revised June, 1974

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MODULE OF INSTRUCTION

Title - ATMOSPHERIC SAMPLING OF STACKS

Code - 01.0606-01

OBJECTIVES to be obtained:

The student will be able to:

1. Explain the difference between source emissions and ambient air and explain their relationship to process operations.
2. Recognize and demonstrate the safety aspects of sampling industrial exhaust stacks.
3. Prepare for the sampling of an exhaust stack for particulate emissions.
4. Make a flow measurement traverse of a stack.
5. Determine the particulate emission rate in pounds per hour from an exhaust stack.

Title - ATMOSPHERIC SAMPLING OF STACKS

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Introductory Discussion of Importance of Sampling of Stacks Objective #1 Explain the difference between source emissions and ambient air and explain their relationship to process operations.	A. Importance of Stack Sampling • Difference between atmospheric source emissions and ambient air • Relationship of source emissions to process operations
Unit 2 - Safety Aspects Concerned with Sampling Stacks Objective #2 Recognize and demonstrate the safety aspects of sampling industrial exhaust stacks.	A. Team relationship B. Protective clothing C. Scaling ladders D. Walking on building roof E. Meterorological conditions F. Electrical hazards
Unit 3 - Preparation for Stack Sampling Objective #3 Prepare for the sampling of an exhaust stack for particulate emissions.	A. Arrangement of equipment B. Selection of sampling point C. Providing access to stack for sampling equipment
Unit 4 - Flow Measurement Objective #4 Make a flow measurement traverse of a stack.	A. Familarity with equipment B. Making a traverse C. Recording of data
Unit 5- Sampling for Particulate Emissions Objective #5 Determine the particulate emission rate in pounds per hour from an exhaust stack.	A. Arrangement of equipment B. Insertion of preweighed filter unit C. Collection of sample D. Recording of data E. Sample handling procedures F. Calculation of particulate emission rate in pounds per hour

EDUCATION 01.0606-01 - Code

ATMOSPHERIC SAMPLING OF STACKS - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
The teacher will use 35mm slides of both real situations as well as illustrated drawings to demonstrate the principles involved.	Observe teacher	Oral test
A. The teacher will use drawings to demonstrate safety aspects. B. The teacher will take the class to a field location and demonstrate the specific attention to safety aspects.	Observe teacher Repeat the techniques in the field as previously demonstrated by the teacher	Check list of student adherence to proper techniques.
A. The teacher will use a laboratory test stack unit to demonstrate the selection of a sampling point and provide access via drilling a hole in the stack.	Observe teacher Repeat teacher demonstrations in laboratory and in the field	Comparison students techniques with those demonstrated by the teacher
A. The teacher will point out the features of a pitot tube and manometer column. B. The teacher will make a traverse on the laboratory test unit and then take the class to the field to demonstrate the technique on an actual stack.	Observe teacher Repeat teacher demonstration in laboratory and in the field	Comparison of student values with those obtained by teacher
A. The teacher will sample the laboratory test unit for particulate emissions. B. The teacher will take the class to the field and sample an actual exhaust stack for particulates. C. The teacher will go through the complete calculation for reporting the final value in pounds per hour of particulate matter being emitted.	Observe teacher Repeat teacher demonstration in laboratory and in the field	Comparison of student values with those obtained by teacher

MODULE OF INSTRUCTION

Title - ATMOSPHERIC SAMPLING OF STACKS

Code - 01.0606-01

RESOURCE MATERIALS

A. Books and Bulletins

1. Xerox copy of selected sections of directions for sampling stacks for particulate matter - ASME Power Test Code No. 27. This bulletin should be available from the State University Library. (ASME-American Society of Mechanical Engineers)

B. Audiovisuals

A special series of slides will have to be prepared by utilizing actual scenes or illustrated drawings in order to demonstrate the principles of stack sampling without going into an involved wordy discussion.

C. Other Equipment

1. A special laboratory demonstration test unit will have to be designed and constructed for use in the area outside of the field. Basically, the unit should consist of a small hood followed by a fan for blowing air through an attached circular exhaust stack. The fan should be selected so that the diameter of the stack will be 10-12 inches in diameter.

2. Equipment for stack sampling must be obtained for use both at the laboratory test unit and in the field. Such equipment should consist of the following as a minimum.

    a. 4' pitot tube-stainless steel
    b. stainless steel circular thermometer
    c. French manometer
    d. stainless steel (2') sampling probe
    e. filter holder unit
    f. sampling pump
    g. dry test meter
    h. dessicator (for drying filter unit)
    i. analytical balance for weighing filter unit

MODULE OF INSTRUCTION

Title - FISH MANAGEMENT

Code - 01.0607 - 01

DESCRIPTION:

The students will gain experience in fish survey methods using trapping, netting, and shocking to establish population counts in lakes, ponds and streams. The relationship and inter-relationships of one fish to another and fish to other major water organisms will be studied. The student will develop a knowledge of the needs of each species found in the pond as it relates to good management. Experience will be gained by working with local members of the Environmental Conservation Department in fish transportation and stocking programs carried out within the area.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Identifying Internal Parts of A Fish	1	3
2. Identifying External Parts of A Fish	1	3
3. Determining Fish Sustaining Criteria Through Water Analysis	2	6
4. Trapping, Netting and Shocking Fish for Survey Work	1	8
5. Transporting and Stocking Fish	1	4
	6	24

Revised June, 1974

MODULE OF INSTRUCTION

Title - FISH MANAGEMENT Code - 01.0607-01

OBJECTIVES to be obtained:
Students will be able to:

1. Name and point out 8 internal parts of a fish.
2. Name and point out 8 external parts of a fish.
3. Identify 10 species of game fish and important minnows of New York.
4. Determine necessary water requirements and habitats for trout, bass and pike in lakes, streams, and ponds.
5. Interpret the 10% light level thus determining Plankton level by using the Secchi disk.
6. Take water temperature in any given body of water and determine stratification and fish adaptability with a temperature accuracy within 3°.
7. Take plankton sample in any given lake or pond so that a biologist may interpret its meaning.
8. Use and interpret Hasche water chemistry kit to test ph within 1 ph level of accuracy and oxygen content to accuracy of 2 parts/million.
9. Construct and use a fish trap and use nets and shocking to count and control fish populations.
10. Repair, maintain and know the correct use of equipment used in taking fish.
11. Successfully handle large numbers of trout with a mortality rate of less than 10%.

Code - 01.0607-01

Title - FISH MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
1. Identifying Internal Parts of A Fish 1. Name and point out 8 internal parts of a fish	• What are the internal parts? • brain • spinal cord • ribs • spine • pharyngeal teeth • gills • gill rakes • pharynx • spleen • intestine • stomach • liver • heart • airbladder • anus
2. Identifying External Parts of A Fish 2. Name and point out 8 external parts of a fish	• What are the external parts? • anterior dorsal fin • posterior dorsal fin • caudal fin • peduncle • anal fin • pectoral fin • scales • pelvic fin • operculum-(gill cover) • lateral line • adipose fin • head length • scales • eye • mouth • barbels • cheek

01.0607-01 - Code

FISH MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Handout-showing internal parts Discussion Chart-cutaway of internal organs Specimens-preserved Dissection of specimens.	Student will dissect and remove parts of the fish. Fill in handout diagram of fish.	Evaluate diagrams for accuracy.
Handouts showing parts Discussion Chart-of parts Specimens-preserved for student study	Students examine preserved specimens and name external parts. Label and hand in diagram.	Evaluate diagram for accuracy.

Code - 01.0607-01

Title - FISH MANAGEMENT

AGRICULTURAL

OBJECTIVES BY UNIT	CONTENT
3. Determining Fish Sustaining Criteria Through Water Analysis 3. Identify 10 game species and important minnows of New York	What are basic water requirements of fish? A. Chemical analysis . O^2 . Ph . CO^2 B. Physical . Temperature . Turdidity (fertility) . Habitat
4. Determine necessary water requirements and habitat for trout, bass, and pike in lakes, streams and ponds. 5. Interpret the 10% light level thus determining plankton levels by using the Secchi disk. 6. Take water temperature in any given body of water to determine stratification and fish adaptability with a temperature accuracy within 3°. 7. Take plankton samples in any given lake or pond so that a biologist may interpret their meanings. 8. Use and interpret Hasche Water chemistry kit to test ph within 1ph level of accuracy and oxygen content to accuracy of 2 parts per million.	What are criteria for various species of fish. A. Trout family . Brook . Brown . Rainbow . Lake B. Sunfish family . Bass . Largemouth . Smallmouth . Bluegills . Sunfish (common) . Rock bass . Crappies C. Pike family . Northern . Pickerel . Muskellunge D. Perch family . Yellow perch . Walleyes . Darters E. Minnow family . Dace . Clubs . Shiners F. Sucker family . Suckers . Carp

E D U C A T I O N

01.0607-01 - Code

FISH MANAGEMENT - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Analysis of date Discussion Charts Test kit use-Hasche Handout Use of Secchi disk Use of electric thermometer Use of plankton net	Field trip to a pond using Secchi disk by lowering into middle of pond until out of sight. Record distance, pull up until visible, record distance, average the two distances, thus getting your 10% light penetration. (Refer to Bull. 2094-USDA) This gives the proper fertility level needed.	Student will be able to identify, by sight, 10 important fish species of New York State. Teacher observation of student procedure in conducting various tests.
Discussion Charts to compare requirements of various species Graphs to show water characteristics re. species Manuals Bulletins Field trips to ponds and streams and lakes Samples of weeds, plankton and fish Maps on location of water (fresh water fish and fishing)	Field trip using Hasche chemical test kit. Take water samples at different levels using water sampler device, mark bottles for later reference using kit check samples to check O^2-PH-CO^2 levels.	
	Contact hatchery supplier and make arrangements to stock fish in landowner's pond. Decide on day and make arrangements for delivery, also contact SCS personnel.	
	Make determination as to fish species to select by applying data and referring to booklet "Fish and Wildlife Resources"-page 64-68-N.Y. Conservation Department	

Code - 01.0607-01

AGRICULTURAL

Title - FISH MANAGEMENT

OBJECTIVES BY UNIT	CONTENT
4 .Trapping, Netting and Shocking Fish for Survey Work 9. Construct and use a fish trap and use nets and shocking to count and control fish populations. 10. Repair, maintain and know the correct use of equipment used in taking fish.	A. **Purposes for taking fish** . Control populations . Fish counts . Eliminating weed species B. Means of taking fish . Trapping . Shocking . Seining C. Repair and maintenance of all equipment used in taking fish including traps, nets, boots, boats and shocking gear.
5. Transporting and Stocking Fish 11. Successfully handle large numbers of trout with a mortality rate of less than 10%	A. What are ways of transporting fish? . Cans . Aereated tank B. How should fish be placed in new environment? . Shock prevention . Mortality . Size . Season

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Field lecture and demonstration of means of taking fish Student exercise (fish pond management)	Student crews will catch fish from a pond, stream or lake using traps, seines and shocking. Students should be aware that permits are required.	Teacher evaluation of student technique in using all means of catching fish.
Student exercise	Student will help clean and repair all the equipment to be used for taking fish.	
Discussion using actual equipment Demonstration showing placement and handling of fish. Handouts-outline procedure. Field trip to stock pond or stream Coordinate with hatchery (fish pond stocking and management)	Students should observe Conservation Department's fish trucks and its system for aerating tanks. Students will participate in stocking fish either in a pond or stream.	Oral quiz on the important points to consider in transporting fish.

RESOURCE MATERIALS

A. Books -

Information Leaflet N.Y.S. Conservation Dept.
1. Fishery Management
2. Some Pan Fish of New York
3. Fresh water fish and fishing
4. Some fishes of New York

U.S. D. A. S.C.S. No. 19 -
How to Manage a Trout Pond

The Conservationist - N.Y.S. Department of Conservation
June-July 1967 Pg. 20 - Catfish of New York
June-July 1969 Pg. 21 - Minnows of New York

B. Bulletins -

Fish Management in N.Y. Farm Ponds
Cornell Ext. No. 1089

U.S.D.A.
Bulletin No. 2154
Trout in Farm Ponds

U.S.D.A.
Bulletin No. 2094
Managing Farm Fishponds
for bass and bluegills

Managing Farm Ponds
for Trout Production - Cornell Ext. Bulletin No. 1036

SCS
Bull: Biology 7, Fish Pond Management, available through IMS
Bull: Biology 9, Fish Pond Stocking and Management

RESOURCE MATERIALS (cont'd)

C. Periodicals -

Carl L. Hobbs
Karl F. Lagler - Fishes of the Great Lakes Region
Ann Arbor - The University of Michigan Press

Eugene P. Odum - Fundamentals of Ecology
W. B. Saunders Comp. - Philadelphia, Pa.

Morgan - Field Book of Ponds and Streams
G. P. Putnam's Sons - New York

- Fresh Water Fishes of Eastern Canada
W. B. Scott - University of Toronto Press

D. Audiovisuals -

Film - Fishing is Fun in Your Farm Pond (14 Min.)
Penn. State College - Cornell Film Lib.

Familiar Fresh Water Fish
Multi-Media Kit

MODULE OF INSTRUCTION

Title - LEVELING

Code - 01.0699-01

DESCRIPTION:

The students will learn where surveying instruments are used and how to set up and use these instruments in a field situation. They will set an instrument over a given fixed point and locate other points in a field in relation to that point. They will measure slopes of varying degree and establish the contour lines of a field. In differential and profile leveling, students will keep a proper notebook and records.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations Class	Time Allocations Other
1. Definition of leveling	2	
2. The tripod and instrument	2	4
3. The rod		4
4. Locating contour lines		4
5. Measuring degree of slope		4
6. Field note taking	2	8
	6	24

Revised June, 1974

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MODULE OF INSTRUCTION

Title - LEVELING

Code - 01.0699-01

OBJECTIVES to be obtained:

The student will:

1. Demonstrate an understanding of leveling concepts by describing each of the following concepts:
    - Curvature of the earth
    - Horizontal measuring
    - Elevation differences

2. Identify field procedures required to:
    - Locate a contour line
    - Determine slope percentage
    - Profile level
    - Differential level

   on a given site to 100 percent accuracy.

3. Set up a level over a stake to accepted relation of bubble to vial markings and plumb bob position to tack head on a given site with complete accuracy.

4. Properly hold and read a rod to the nearest 1/100 foot.

5. Use a hand level in a given field situation to establish contour lines within two feet per 1000 feet of distance.

6. Use a hand level in a given field situation determine slope percent within one percent of difference.

7. Use a guidelines sample note form to properly record and calculate field data collected for differential on a given site to 90 percent accuracy.

8. Use a quick line sample form properly record and calculate field data collected for profile leveling on a given site to 90 percent accuracy.

OBJECTIVES BY UNIT	CONTENT
Unit 1. - Definition of leveling Objective #1 Demonstrate an understanding of leveling concepts by describing each of the following concepts: . Curvature of the earth . Horizontal measuring . Elevation differences Objective #2 Identify field procedures required to: . Locate a contour line . Determine slope percentage . Profile level . Differential level on a given site to 100 percent accuracy	A. Process Definition B. Jobs Requiring leveling . Establishing contours . Building ponds . Establishing log roads . Building foundations . Misc. C. Instruments Used . Hand level . Tripod level . Graduated rod
Unit 2. - The tripod and instrument Objective #3 Set up a level over a stake to accepted relation of bubble to vial markings and plumb bob position to tack head on a given site with complete accuracy.	A. Parts (major) of level . Telescope . Leveling device . Leveling plate & head . Tripod B. Types of levels . Wye . Dumpy . Transit C. Care of level . Transportation . Storage . In use D. Setting up level . Leveling screws . Plumb bob . Tripod

EDUCATION

Module LEVELING 01.0699-01

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Chalk talk - necessity, of leveling foundations - tiling fields contours - drainage systems	Student indicates on paper, 10 conservation related activities which were done on the school grounds which required some knowledge of leveling.	Have each student demonstrate proficiency with hand level (exercise demonstration)
Demonstration of hand level tripod and level	Select a level area and have students sight on a marked board (or leveling rod) a few feet away with a hand level to experience proper relation of bubble reflection and cross hair.	
Demonstration of Dumpy, Wye and Transit levels and overseeing each student thru entire procedure Care in using these precision instruments	Students properly set up and use leveling screws to position level over stake and tack. "Bug" instruments before each set up and check results. Utilize itemized grade sheet to establish proficiency with maximum time limits allowed.	Proficiency with these instruments will show up later in laboratory exercises in the field.

AGRICULTURAL

Module LEVELING

01.0699-01

OBJECTIVES BY UNIT	**CONTENT**
Unit 3. - The rod Objective 4 - Properly hold and read a rod to the nearest 1/100 foot.	A. Types of Rods . Self reading rod . Target rod B. Reading Designations . Feet . 10ths ft. . 100ths ft. C. Proper holding . Vertical . Finger positions . Elbow prop . Rod protection D. Use of Hand Signals . Time utilization . Misunderstanding
Unit 4. - Locating contour lines Objective 5 - Use a hand level in a given field situation to establish contour lines within two feet per 1000 feet of distance.	A. Contour line definition B. Use of contour lines . Land use planning . Water impoundment C. Establishment of a contour line
Unit 5. - Measuring degree of slope Objective 6 - Use a hand level in a given field situation determine slope percent within one percent of difference.	A. Slope % Definition B. Application of slope % . Land use planning . Checking "jobber" performance to contract log road specifications C. Determination of slope % . Single man with hand level . Two man teams-level man and rod man

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Each student studies rod carefully so he is familiar with divisions and sub-divisions. Demonstrate importance of holding rod truly plumb and how carelessness on part of rod man can make much work in the field worthless.	In lab set up levels and self reading rods. Students on own to take proper readings and record. In field set up over points of known elevation and have paired students determine the differences in elevation.	Use laboratory field exercise and test team individuals.
Chalk talk defining contour - Demonstrate using instruments The use of topographic maps [illegible]y aid the discussion.	Establish by staking points in the field through which a contour is to pass. Pair students, one acting as a levelman and the other a rod man - alternate assignments. The level man by sighting on an established physical feature of the rod man and adjusting his position up or down the slope at 50-100 ft. intervals establishes an approximate contour line by staking.	Oral and written test on contour procedure.
Chalk talk and discuss % slope definition - What it means and how to determine % slope. Demonstrate hand level again Check with each student	On a slope one man using a hand level and knowing his eye level (H) selects an object on the ground and moves down the slope until the object is level with the eye. The distance (D) is measured and slope % computed $\% = \frac{H}{D} \times 100$ On a slope 2 men measure 100 ft. horizontally. Levelman takes mid-point position and takes rod reading at upper and lower point. Difference between readings equal slope%. On a slope a man ocularly estimates (using the eye and thumb) a horizontal line to a point on the ground. He then paces this distance and calculates (% grade=half the no. of paces).	Check team's proficiency on a laboratory field exercise.

Module LEVELING 01.0699-01

OBJECTIVES BY UNIT	CONTENT
Unit 6. - Field note taking Objective #7 Use a guidelines sample note form to properly record and calculate field data collected for differential on a given site to 90 percent accuracy.	A. Field Notes Defined . Pencil . Sketches . Erasures . Permanent record . Accuracy . Contents B. Differential Leveling Defined C. Content arrangement . Descriptive title . Column titles and description . station . backsight . height of instrument . foresight . elevation . distance . bench mark . turning point . Sketches . Crew . instrument man . rodman . Weather D. Data Entry & Calculation E. Accuracy Check
Objective #8 Use a quick line sample form properly record and calculate field data collected for profile leveling on a given site to 90 percent accuracy.	Profile leveling A. Profile Leveling Defined B. Content Arrangement . See (C) under Unit 6 C. Data Entry & calculation D. Accuracy check

TEACHING METHOD	STUDENT APPLICATION ACTIVITY	EVALUATION PROCEDURES
Use a predesigned format handout and follow thru a simple problem using all the content terminology and fitting each in place in the data sheet. Repeat procedure until each student follows well. After showing procedure, give students a problem in differential leveling and have them put data in proper places.	With format, students break into two man crews and alternate assignments. Using a level and rod, readings are taken between assigned points. Proper entries are made in a blank note sheet similar to the format. Calculations are made and the line run a second time as an accuracy check. In lab, students are given series of hypothetical readings on blackboard. Proper entries are made and necessary calculations completed.	Written test on field note form.
	Profile leveling	
	Stake out in the field points at 25 ft. intervals on a gradual slope. Students to pair up, take readings and, following field note format, make proper entries to determine difference in elevation between the two stations. In lab, students given series of hypothetical readings on blackboard. Proper entries are made and necessary calculations completed.	On spot test as student team performs profile leveling job.

MODULE OF INSTRUCTION

Title - **LEVELING** Code - 01.0699-01

RESOURCE MATERIALS

Books:
Short Course to Surveying
Davis & Kelly
McGraw - Hill

Bulletins:
Film strips

1) Use of the level - Setting up the Instrument
   Calif. State Polytechnic College
2) Use of the level-Reading the Rod
   Calif. State Polytechnic College
3) Recording Field Notes and Using the Level in Farm Surveying
   Ag. Engineering Dept., Univ. of Illinois, Voc. Ag Service, 434 Mumford Hall, Urbane, Illinois

MODULE OF INSTRUCTION

Title - CONSERVATION STRUCTURES (Masonry) Code - 01.0699-02

DESCRIPTION:

The students will stake out a building on a predetermined location. They will erect batter boards to designate where the four corners will be located and mark the boards to insure a square and level building foundation. Many types of concrete masonry materials will be used so that the students will gain experience by constructing various structures. Different concrete mixes will be fitted to the appropriate job requirements. The students will figure the amounts of concrete and other materials necessary to complete a small masonry job.

	MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
		Class	Other
1.	Staking out a building with the level	1	4
2.	Batterboard erection		4
3.	Survey of materials used on masonry and wall construction.		2
4.	Making quality concrete	1	4
5.	Wall construction with block units		6
6.	Concrete slabs		2
7.	Constructing a small concrete structure	1	5
		3	27

Revised March 1974

MODULE OF INSTRUCTION

Title - CONSERVATION STRUCTURES (Masonry) Code - 01.0699-02

OBJECTIVES to be obtained:

The student will:

1. Stake out a building at a predetermined field site to within one inch of distance and one degree of direction.
2. State or write correctly (to instructor's standards) a definition of batterboards with respect to their function, need, and components.
3. Erect batterboards in the field which check diagonally within ½ inch and the level checks to within ½ inch per 40 feet of distance.
4. Identify by common name and use -- types of precast concrete construction products.
5. State or write an accurate definition (to instructor's standards) of concrete in terms of its four basic components, and in terms of standards of utilization for each of those components.
6. Write or state the proper mix for at least 4 different types of jobs, and write or state correct reasons as to why the mixes differ, (to instructor's specifications).
7. Accurately calculate the amount of concrete needed for a given hypothetical structure.
8. Perform the task of mixing concrete using a prescribed mix (to instructor's standards).
9. Write or state the purpose and specifications of a normal wall supporting footing.
10. Design a footing using accepted procedure for depth, width, and thickness (to instructor's standards).
11. Perform accurately and correctly the task of laying block (to instructor's standards).
12. Write or state five uses of concrete slabs.
13. Demonstrate safe, efficient, and effective participation in the preparation of a site for pouring a concrete slab.
14. Demonstrate safe, efficient, and effective participation in the pouring and treatment of a concrete slab.
15. Safely, effectively, and efficiently (to instructor's standards) design and construct a small concrete structure.

Code - CONSERVATION STRUCTURES (Masonry)

AGRICULTURAL

Title - 01.0699-02

OBJECTIVES BY UNIT	CONTENT
Unit 1- Staking out a building with the level Objective 1 The student will be able to stake out a building at a predetermined field site to within one inch of distance and one degree of direction.	A. Staking a building - . Choice of location in respect to other features . curbs and property lines . other structures . Setting the level over a point . tripod . leveling head . plumb bob . stake and tack . Staking of a proposed building . reference location . dimensions of building . axis direction of building . materials headed . listing located in filmstrip . setting direction stakes . method in filmstrip . extending line . turning 90 degree corner angles . measurement with steel tape . checking accuracy . diagonal steel tape measurement

EDUCATION 01.0699-02 - Code

CONSERVATION STRUCTURES (Masonry) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Objective 1 Filmstrip and discussion of proper methods of using level in staking out building Demonstrate using two students the proper method of staking out a building. Student practice - break students into teams of three and stake out building on a level area.	Student groups to properly set up a level ove point in the field. Using a marked reference location he will stake out a 30 Ft. X 60 Ft. building. A location and long axis direction will be given to him (I.E. the S.W. corner is to be located 50 feet east and 10 feet north of the S.E. corner of the garage. The long axis is to run in an E.W. direction). By line elongation and turning 90 degree angle with the level, stakes will be driven in all four corners. Distances and diagonal accuracy checks will be made with the steel tape. The activities will be related to those found in the listed filmstrip. If a corresponding job situation is in progress in the area observe via a field trip, if possible.	A. Accuracy of instrumentation and corner layouts to a standard of one inch of distance and one degree of direction.

Code - 01.0699-02

Title - CONSERVATION STRUCTURES (Masonry)

A G R I C U L T U R A L

OBJECTIVES BY UNIT	CONTENT
Unit 2 - Batterboard Erection Objective 2 State or write correctly (to instructor's standards) a definition of batterboards with respect to their fuction, need, and components.	A. Definition of Batterboard - . Function - to provide line for structure, excavation, and foundation trenches. . Need - to preserve structure , excavation, and/or foundation trench lines when structure corner stakes may be damaged or destroyed during excavation. . Components - . batterboard posts . batterboards . corner stakes B. Position . Corner Stake . Height (prescribed)
Objective 3 Erect batterboards in the field which check diagonally within ½ inch and the level checks to within ½ inch per Forty Feet of distance.	C. Erection . Leveling corner posts . level and tripod . Leveling batterboards . carpenter level D. String location . Intersection over corners . plumb bob . Marking batterboards . saw cuts . finish nail . Diagonal accuracy check . steel tape

E D U C A T I O N 01.0699-02 - Code

CONSERVATION STRUCTURES (Masonry) - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Objectives 2 & 3 Filmstrip and discussion of batterboard erection		A. Written or verbal examination.
Student practice use same student groupings as in Unit 1 to erect batterboards on staked out site.	Student to gather materials and erect batterboards on site previously staked out. Height to be 3½ - 4 feet with stakes of 2" X 4" stock. Batterboards to consist of 1" X 6" stock. Student intersect over corners using string and a plum bob.	
	Check accuracy of intersects with diagonal accuracy check.	B. Evaluation based on neatness and efficiency of work; and on accuracy of work based on a standard of acceptance of ½" diagonally and ½" per 40 ft. of distance.
	The activities will relate to the listed filmstrip.	
	Visit a construction site and view batterboards and excavation.	

Code - 01.0699-02

Title - CONSERVATION STRUCTURES (Masonry)

OBJECTIVES BY UNIT	CONTENT
Unit 3 Survey of materials used on masonry and wall construction. Objective 4. Identify by common name and use -- types of precast concrete construction products.	A. Precast concrete construction products . Concrete block . unit dimensions - 7 5/8" X 7 5/8" X 15 5/8" equal 8 X 8 X 16" unit. . aggregate . heavy weight . gravel etc. . lightweight . cinders etc. . concrete tile . Misc. precast units . brick . flagstone
Unit 4 - Making Quality concrete Objective 5 The student will be able to state or write an accurate definition (to instructor's standards) of concrete in terms of its four basic components, and in terms of standards of utilization for each of those components.	A. Components of concrete and their utilization standards. . Water . use only that relatively free of alkalines, acids, oil, dirt. . potable water is generally acceptable . Cement . five types of Portland Cement . keep dry till use . roll sack if caked due to stacking pressure . Fine aggregate . generally sand will pass through mesh screening having ¼" sq. opening. . free of dust . Coarse aggregate . ¼" to 1 ½" and larger . commonly pebbles, crushed stone

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Objective 4 Field trip to building materials store. Discuss with salesman various materials and their uses.	Have students fill out field trip report concerning different materials used in masonry construction	Evaluate student Field trip report for completeness and accuracy.
Objective 5 Chalk talk with concrete components for student examination. Demonstrate samples of concretes of different mixes. Demonstrate components of poor and acceptable quality for use in concrete mix.	Students observe concrete components and various mixes.	A. Written or oral examination requiring facts in regard to the four components of concrete and their utilization standards.

OBJECTIVES BY UNIT	CONTENT
Unit 4 - Concrete slabs Objective 6. The student will be able to write or state the proper mix for at least 4 different types of jobs, and write or state correct reasons as to why the mixes differ, (to the instructor's specifications).	B. Mixes . Proportion by pail or shovel . Suggested proportion of materials . 4-8" thick . 2-4" thick (Table Page 23 - concrete structures guide)
Objective 7 The student will be able to accurately calculate the amount of concrete needed for a given hypothetical structure.	C. Estimating Materials Needed . By individual job . Calculating cubic areas
Objective 8 The student will be able to perform the task of mixing concrete using a prescribed mix (to instructor's standards).	D. Mixing Methods . Large quantities . ready mix . Field projects . generator . maintenance . mixer . care and maintenance . cleanup . wheel barrow . hoe, shovel, pail

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Objective 6 B. Class discussion of the properties of concrete and its components.	Using a table (materials needed to make a cu yd. of concrete Page 24 - Concrete structure guide Portland Cement Association) Students will estimate materials needed to do a particular job. Complete example on Page 24 (see above)	**Objectives 6 & 7** Instructor evaluate students ability to accurately prescribe the proper cement mix for various hypothetical jobs and to calculate the cu. yards of cement needed to complete each job.
Objective 7 C. Student practice in estimating the needs for concrete for a structure. Field trip.	Vist a concrete mixing plant or sand and gravel processing plant. Students to note screening, grading and washing.	
Objective 8 D. Demonstration of proper mixing techniques using two students to assist. Have students mix concrete for a structure.	Students mix concrete for a structure using a portable mixer. Incorporate this activity with one of the following units (Unit 7)	D. Instructor evaluate each students ability to safely, effectively and efficiently participate in mixing concrete to a prescribed mix.

Code - 01.0699-02

Title - CONSERVATION STRUCTURES (Masonry)

OBJECTIVES BY UNIT	CONTENT
Unit 5. - Wall construction with block units Objective 9. The student will be able to write or state the purpose and specifications of a normal wall supporting footing.	A. Footings . Provide support for wall . Frost Penetration . Recommended Dimension . width . 2 X wide as wall is thick . thickness . Equal to ½ of width
Objective 10 The student will be able to design a footing using accepted procedure for depth, width and thickness, to instructor's standards.	B. Design of hypothetical footing . Dimensions . Cubic feet of concrete . Size and grade of aggregates mix
Objective 11 The student will be able to perform accurately and correctly the task of laying block, to instructor's standards.	C. Block Laying . Techniques . bedding starter course . building corners . mortars for concrete walls . alignment of courses . jointing . block cutting . Hand Tools . line and level . trowels . joint tools . hammer and chisel . hand level

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A-B Class discussion on the needs, location and dimensions of a footer.	A. Student discussion and observation. B. Student practical work experience through detailed design of a hypothetical footing	A. None B. Evaluation of accuracy and completeness of student work.
(see B. above in next squares)		
C. Demonstration of block laying Demonstrate tools used in block laying. Student practice on laying block field or in shop, use non hardening mortar.	C. Students observe demonstration in blocklaying. Student practical work experience through participation block laying.	C. Evaluation of accuracy, safety, and efficiency of student work in the use of masonry hand tools in performing all six tasks in block laying to instructor's standards.

Code - 01.0699-02

AGRICULTURAL

Title - CONSERVATION STRUCTURES (Masonry)

OBJECTIVES BY UNIT	CONTENT
Unit 6 - Concrete slabs Objective # 12. The student will be able to write or state five uses of concrete slabs.	A. Uses . Floors . Driveways . Sidewalks . Patios . Fireplaces, etc.

Objective 13
The student will be able to demonstrate safe, efficient, and effective participation in the preparation of a site for pouring a concrete slab.
	B. Preparation of Site
	. Tamping
	. Watering
	. Forms
	  . oiling
	  . wood
	  . metal, etc.

Objective 14
The student will be able to demonstrate safe, efficient, and effective participation in the pouring and treatment of a concrete slab.
	C. Pouring
	. Striking
	. Separator
	  . expansion and contraction
	. Floating
	. Finishes
	  . edger
	  . jointer
	  . brooming
	. Curing
	  . burlap
	. Reinforcing

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Student discussion of uses for concrete slabs. Use of field trip or visuals.	A. Student observation and/or discussion.	A. None
B. Demonstrate preparation of site-use two students to assist. Students participate in preparation of a site.	B. Student observation of tasks performed. Student practical work experience through participation in the preparation of a site.	B. Instructor evaluate students safety, efficiency, and effectiveness on his participation in the preparation of a site.
C. Students participate in pouring and finishing concrete (mixed in Unit 4)	C. Student practiced experience through participation in the pouring and finishing of concrete.	C. Instructor evaluate students safety, efficiency, and effectiveness in his participation in pouring and finishing concrete. Oral test on procedures to follow in laying out and pouring a concrete slab.

Code - 01.0699-02

AGRICULTURAL

Title - CONSERVATION STRUCTURES (Masonry)

OBJECTIVES BY UNIT	CONTENT
Unit 7 - Constructing a small concrete structure. Objective 15. The student will be able to safely, effectively, and efficiently, to instructor's standards, design and construct a small concrete structure.	A. Design, plan, and compile a bill of materials list . Recreation . bench . pool "Show" . lamp post . barrier, etc. . Domestic . patio blocks . fire place . bird bath . trash burner . clothesline post, etc. . Soil and Water . spillway . ford . septic tanks . well platforms . well caps . watering tank B. Construction . Materials . Site preparation . Form construction . Pouring . Finishing . edging . coloring, etc.

EDUCATION

01.0699 -02 - Code

- Title

CONSERVATION STRUCTURES (Masonry)

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Have student select a project and prepare plans in class.	Student Utilizing school library will develop a plan for some small concrete project (I.E. Home Handyman guide) The plan will include scale drawings and material list.	A. Instructor be certain student's work in the design and materials listing is accurate and workable; and not over his head for a two day construction limit. (or else allow a longer period of time for construction beyond time period of the module and hold student's grade until project is completed - best to set a deadline for work-to be done after school hours.) Evaluate design for proper mix and quality of concrete in the specs.
Student practice in construction of project - work two students together on each project. School projects if of adequate size will take precedence over home projects.	Upon completion of plan student will construct forms and complete project. If possible participation in field projects such as step building slab pouring, fire place building, etc.	B. Evaluate for correctness and completeness and safety in construction methods.

MODULE OF INSTRUCTION

Title - CONSERVATION STRUCTURES (Masonry) Code - 01.0699-02

RESOURCE MATERIALS

A. Books - The Popular MECHANICS Home Handyman Encyclopedia and Guide
J.J. Little and Ives Company Inc. New York - 1961 Volume Four.

B. Bulletins - Concrete Masonry Handbook - Portland Cement Association
33 W. Grand Ave.
Chicago, Illinois AIA File No. 10-C

Concrete Structures for Farm Water Supply and Sewage Disposal - Portland Cement Assoc.

AND

Building Concrete Farm Structures - Portland Cement Association

AND

Recommended Practices for Laying Concrete Block - Portland Cement Association, 33 W. Grand Avenue, Chicago, Illinois 60610

The Park Practice Program Outline - National Conference on State Parks, 901 Union Trust Building, Washington, D.C. (Plans and specifications for recreational structures)

C. Audiovisuals -

Filmstrip - Using the Level to stake out a Building Site - 439 - Vocational Agriculture Service, 434 Mumford Hall, Urbana, Illinois

MODULE OF INSTRUCTION

Title - CONSERVATION STRUCTURES: CARPENTRY

Code - 01.0699-03

DESCRIPTION:

This module will give training to the resource worker who eventually will be involved in some phase of building or maintenance of structures. Training will include drafting of project plans and quantity cost lists to avoid waste and develop the ability to calculate small project costs. Students will be involved in the use of major hand and power tools and using correct construction materials. Content also includes involvement in rough framing techniques used in building construction. A portion of shop work will include project construction.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocations	
	Class	Other
1. Three view project planning	2	
2. Quantity-cost list development	1	1
3. Tool identification and use	1	1
4. Wood fasteners	1	1
5. Construction material	1	2
6. Rough framing	2	3
7. Wood waste planning	1	
8. Conservation project construction		10
9. Wood waste project construction		3
	9	21

Revised June, 1974

MODULE OF INSTRUCTION

Title - CONSERVATION STRUCTURES CARPENTRY Code - 01.0699-03

OBJECTIVES to be obtained:

1. Develop a three view plan for a small wood material conservation related project (i.e., picnic table, plank bench, camp furniture, etc.) to scale (approximately 1" = 1') and finished in black ink following prescribed procedure.

2. Develop a quantity-cost list following prescribed procedure for the proposed project in objective number one. Students to secure prior quotes via local vendors.

3. Identify and state function and proper use for 9 of 10 carpentry related hand and power tools from an assigned responsibility list.

4. Correlate and identify assigned kinds of wood fasteners to their specific characteristics and recommended use through answering 8 of 10 written questions.

5. Correlate the kinds of lumber and other wood material to their specific characteristics and recommended usage by answering 8 of 10 written questions.

6. Demonstrate graphically or through material usage various wood rough framing techniques following written guidelines.

7. Design a workable three view sketch following prescribed standards of a conservation related project (i.e., pole furniture, slab bench, wildlife housing, etc.) that utilizes usual wood waste (i.e., slabs, slash, poles).

8. Construct a project in the shop using the three view plan, quantity-cost list and hand power tool assignment developed in objectives 1, 2 and 3.

9. Construct in the shop the "usual wood waste project" following the design developed in objective 7.

Code - 01.0699-03

Title - CONSERVATION STRUCTURES CARPENTRY

AGRICULTURA

OBJECTIVES BY UNIT	CONTENT
Unit 1 Three View Plan Objective #1 Develop a three view plan for a small wood material conservation related project (i.e., picnic table, plank bench, camp furniture, etc.) to scale (approximately 1" - 1') and finished in black ink following prescribed procedure.	A. Plan Format . Top view . Side view . End view B. Drafting . Drafting board . T- square . Miscellaneous (i.e., pencil, ruler, etc.) . View lines C. Scale . Measurements D. Plan Workability . Accuracy . Clarity E. Plan need
Unit 2 Quantity-Cost List Objective #2 Develop a quantity-cost list following prescribed procedure for the proposed project in objective #1. Students to secure prior quotes via local vendors.	A. List Need . Planning . Job quotes B. List Contents . Material description . Quantity . Unit cost . Total cost . Man hours . Total cost C. List Format . Heading placement D. Securing Cost Information . Vendors . Contractors

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Lectures and discussion B. Sample plan formats for student viewing C. Various working plans made available so that students may pick up ideas for a potential project. D. Because of time limitations a small project should be planned	A. Student will develop his own planned project and present his project on paper and in ink to working scale B. He will formulate creative thinking by viewing work of others	A. Plan may be graded by applying numerical percent to such items as . Follow instructions . Workability . Accuracy . Neatness . Clarity, etc.
A. Lecture and discussion B. Sample cost lists for student viewing C. Self input to secure quotes	A. Student will develop a quantity-cost list to complete the project in objective 2. B. He will converse via telephone, etc. with local vendors, etc. to secure cost quotes. C. Student will correlate a plan and needs to finish a project on his own.	A. Plan may be graded by applying grade percent to such items as . Following instructions . List clarity . Math accuracy . Requirement to finish proposed project, completeness, etc. B. Man hours for project completion should be kept track of as project progresses to make a comparison check of proposed and actual time spent

Code - 01.0699-03

Title - CONSERVATION STRUCTURES CARPENTRY

OBJECTIVES BY UNIT	CONTENT
Unit 3 Hand - Power Tool Identification and Use Objective 3 Identify and state function and proper use for 9 of 10 carpentry related hand and power tools from an assigned responsibility list	A. Use and Care . Safe Handling . Storage . Cleaning . Maintenance B. Power Tools . Safety apparel . goggles . clothes, etc. . Safety Devices . guards . electrical plugs, cords . working area . co-worker . Specific Use . suggest securement of publications such as from major tool companies which list types and function of such items as . power table saws . power hand saws . power planer . power drill and drill press . power sander . power overhead saws . Identification and nomenclature of above C. Hand tools . Same as for power tools . See bulletin section for publications

EDUCATION

01.0699-03 - Code

CONSERVATION STRUCTURES CARPENTRY - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Demonstration of proper use of described items B. Visual list of tools with name, function and picture (See Bulletin section)	A. Student will observe and handle tools relating their use and name to the assigned tool list or publication. Students may pair up and quiz each other on unit content in preparation for evaluation.	A. Instructor may evaluate by displaying tools and asking for name, proper use, etc. B. This may be written or oral.

Code - 01.0699-03

Title - CONSERVATION STRUCTURES CARPENTRY

OBJECTIVES BY UNIT	CONTENT
Unit 4 Wood Fasteners Objective # 4 Correlate and identify assigned kinds of wood fasteners to their specific characteristics and recommended use through answering 8 of 10 written questions.	A. Nailing Techniques . Toe nailing . Clout nailing (boat building) . Face or direct nailing . Nail gun . Staple gun B. Nails . Sizes . Types and Use . common nail . coated nail . roofing nail . finish nail C. Glues and Adhesives . Waterproof . weldwood, etc. . Adhesives . plaster, etc. D. Screws . Counter sink . Plug . Types and use E. Miscellaneous . Rafter ties . Post-joist ties . Bolts
Unit 5 Wood Construction Material Objective # 5 Correlate the kinds of lumber and other wood material to their specific characteristics and recommended usage by answering 8 of 10 written questions	A. Lumber Yard Sizes . Rough cut . Dressed cut B. Measurement . Board feet . Lineal foot . Piece C. Specie and Usage . Framing . Flooring . Decking . Marine use . Sheathing D. Plywood . Exterior-Interior . 3-5 ply . Grades E. Miscellaneous . Logs - Poles . Slabs . Shakes . Siding 365 8

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Lecture and discussion B. Visual aid of fastener types and use C. Self-team study	A. Students pair off and quiz each other on names and uses of fasteners to prepare for quiz.	A. Instructor may evaluate by displaying sample fasteners and ask for written identification and use. B. A numerical grade may be arrived at if needed
A. Lecture and discussion B. Visitation to lumber yard C. Visual aids . Nail sizes and types . Screw sizes and types . Slide set of lumber types and use	A. Students pair off or study independently the types and correlated uses of various wood construction materials for evaluation preparation	A. Student evaluated by written test on specie and uses, measurement determination, various assigned wood materials

Code - 01.0699-03

Title - CONSERVATION STRUCTURES CARPENTRY

OBJECTIVES BY UNIT	CONTENT
Unit 6 Rough Framing Objective #6 Demonstrate graphically or through material usage various wood framing techniques following written guidelines.	A. Building types (Structural Lumber) . Single sill . Three piece girder . Joist and breaking . Bridging . Sub floor . Sole plate . Post . Studs . Top plate and bracing . Ribbon brace . Door-window openings . Roof peak and knotched rafters . Sheathing . Shingles . Siding B. Log Building . Notching . Chinking C. Roofing . Wood shingles . Rolled roofing . Asphalt roofing
Unit 7 "Wood Waste" Plan Objective #7 Design a workable three-view sketch following prescribed standards of a conservation related project (i.e., pole furniture, slab bench, wildlife housing, etc.) that utilizes usual wood waste (i.e., slabs, poles, etc.)	A. Contents Same as for Objective #1 except for ink finishing B. "Wood Waste" Source . Saw mills . Thinnings . Lake shores
Unit 8 Project Construction Objective #8 Construct a project in the shop using the three-view plan, quantity cost list and hand-power tool assignment developed in objectives 1, 2, and 3.	A. Work area B. Using plan
Unit 9 "Wood Waste" Project Objective #9 Construct in the shop the "usual wood waste" project following the design developed in objective #7.	Same as objective 8

EDUCATION

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CONSERVATION STRUCTURES CARPENTRY - Title

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Lecture B. Visitation trip to house, pole, barn, etc. being framed C. Construction of small building if possible D. Self study of supplied rough framing guidelines E. Visitation to log structure to view notching and chinking F. See Publication List G. Visitation to recreation area to view log structures including tables, furniture, outbuildings, recreation buildings	A. Student, after viewing for study the framing guides, will team quiz and view a building in the area being framed B. If the opportunity is available students should construct or help in the construction of a small building C. Students to visit log building and note for evaluation quiz notching and chinking	A. Student to be evaluated by sketching framing techniques as indicated by the instructor
A. Various working plans made available for viewing to stimulate ideas B. Discussion C. Visit to a source (sawmill, thinning, etc.)	A. Student to create useful conservation project sketch from usual wood waste	A. Same as for Objective 1
A. Student to construct project planned in objective 1 and 2 B. Project shop work C. Discussion	A. Student to use prior information in module to construct the project of his choice B. Student will keep track of man hours and compare to plan with cost analysis	A. Evaluate by comparing project to plan B. Can grade by attaching % to the following . Followed plan . Shop safety . Craftsmanship . Utilization of work time . Clean up and tool maintenance
Same as objective 8	Same as objective 8	Same as objective 8

Title - CONSERVATION STRUCTURES CARPENTRY Code - 01.0699-03

RESOURCE MATERIALS

Manuals

National Conference on State Parks, 901 Union Trust Building, Washington, D.C. in cooperation with National Park Service, U.S.D.I.

Bulletins

Technique of House Nailing, Housing and Home Finance Agency, Washington, D.C.

Building With Logs, Pub. #579, U.S.D.A., U. S. Forest Service

Periodicals

Stanley Tool Guide Form #75/870, Division of the Stanley Works, New Britain, Connecticut 06050

MODULE OF INSTRUCTION

Title - Service and Repair of Conservation Equipment   Code - 01.0699-04

DESCRIPTION:

This module is planned to review the equipment that has been and is going to be used in the conservation program with an eye to keeping each piece of equipment in shape for use when needed. Every piece of equipment must have day to day maintenance plus long-range maintenance. The students will adjust and sharpen hand tools and repair the tools where possible. The power equipment will be serviced as part of a year around maintenance plan. Minor repairs will be made to the equipment to keep it in good working order. Each student will have the opportunity of working on the various pieces of equipment that are closely allied to his interests and occupational goals.

MAJOR DIVISIONS OR UNITS OF CONTENT	Time Allocation	
	Class	Other
1. Hand Tools	2	8
2. Power Tools	4	16
	6	24

Revised July 1975

MODULE OF INSTRUCTION

Title - Service and Repair of Conservation Equipment Code - 01.0699-04

OBJECTIVES to be obtained:

The student will:

1. Identify all hand tools in a given shop by the proper name.
2. Select the proper hand tool to be used on a given job, as deemed satisfactory by the instructor.
3. Demonstrate the safe use of any hand tool on a given job to produce a quality job, as deemed satisfactory by the instructor.
4. Maintain, to the satisfaction of the instructor, all hand tools in the shop.
5. Sharpen, to the instructor's standards, any tool found in a given shop using commonly found sharpening tools.
6. Adjust hand tools so the tool performs its job adequately as seen proper by the instructor.
7. Identify with the correct name all power tools in a given shop as evidenced by a quiz.
8. Select the proper power tool properly equipped for doing a given job.
9. Operate any power tool in a safe manner as observed by the instructor to complete a list of assigned operations.
10. Maintain the power tools found in a given shop at an operational level deemed satisfactory by the instructor.

Cide - 01.0699-04

Title - Service and Repair of Conservation Equipment

OBJECTIVES BY UNIT	CONTENT
Unit 1 - Hand Tools Objective 1 Identify all hand tools in a given shop by the proper name	Identification of Hand Tools . Carpentry tools . Plumbing tools . Metal working tools . Wrenches . Forestry tools . Firefighting tools . Measuring tools . Gear Pullers . Jacks . Electrical tools . Cleanup tools . Cement working tools . Ropes . Other
Objective 2 Select the proper hand tool to be used on a given job, as deemed satisfactory by the instructor.	Selecting the Proper Hand Tools Function of the different tools . The size and location of the job . Precision required on the job . Speed required . Tools available, size, type . Types of a given tool available
Objective 3 Demonstrate the safe use of any hand tool on a given job to produce a quality job, as deemed satisfactory by the instructor	Safe Use of Hand Tools Safe operating procedure for using hand tools A. Factors to consider . Position of the work . Proper grip on the tool . Working angles of the tool . Safe working speed . Position of the operator . Safe operating conditions . Clean, neat work area . Work area large enough

DUCATION

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TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Show actual tools in shop B. Use overhead transparencies (teacher made) C. Read leaflet ABC's of Hand Tools D. Go through tool identification cards E. Use tool companies catalogs	A. Study tool identification cards B. Identify tools in the shop correctly	A. Quiz on 25 identification cards B. Lab identification of 25 tools at different stations write correct name of these on quiz.
A. Demonstrate to small groups B. Filmstrips C. Read ABC's of Hand Tools D. Movie-ABC's of Hand Tools E. Show in field	A. Students choose proper tools during the module B. Select proper tools for mock or "paper" jobs example -	A. Oral quiz on shop jobs B. Pose mock situations and students list proper tools (example-List proper tools for installing a new roof on a house.)
A. Demonstrations B. Filmstrips (IMS) C. Teacher set the example by using tool in a safe manner D. See the operator's manual for the given tool	Under the supervision of the instructor the student will complete a checklist of operations in each class of tools which indicates the student's proficiences on a given tool	A. Completion of a checklist of operations safely and properly completed. B. Part of daily grade

OBJECTIVES BY UNIT	CONTENT
Objective 4 Maintenance of Hand Tools Be able to maintain, to the satisfaction of the instructor, all hand tools in the shop.	Maintenance of Hand Tools . lubrication . cleaning . checking for defects and worn parts . replacing parts, refitting . proper storage
Objective 5 Sharpening Hand Tools Be able to sharpen, to the instructor's standards, any tool found in a given shop, using commonly found sharpening tools.	Sharpening Hand Tools . proper use of sharpening tools ex. grinder, files, hones . proper sharpening angles, and other specifications to be met
Objective 6 Adjusting Hand Tools Be able to adjust hand tools so the tool performs its job adequately, as seen proper by the instructor.	Adjusting Hand Tools . the functions of the various parts of hand tools . adjustment of hand tools

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Demonstration to small group B. Filmstrips (IMS) C. See operator's manual	A. Students maintain all shop tools throughout the module B. Students bring in tools in need of maintenance from home and perform the needed work C. Store tools properly at the end of each day	A. Proper storage & cleanliness of tools can be a part of daily grade B. Mark assigned tool maintenance projects brought in from home and completed (minimum 5 projects) C. Complete checklist of operations completed to satisfaction of the instructor
A. Demonstrations to small groups B. Lecture with overheads to show angles, procedures, etc. C. See the instruction sheet that came with the tool	A. Students sharpen tools as required throughout the module B. Students sharpen tools as required throughout the module	A. Check off sheet when a certain job is completed to the satisfaction of the instructor-a minimum number of completions necessary B. Grade assigned projects
A. Demonstrations to small groups B. Read operator's manual	A. Adjust tool in the shop during the module B. Adjust tools while using them C. Adjust purposely maladjusted tools	A. Students will adjust a number of maladjusted tools B. Observation by the instructor that tools being used by student are properly adjusted

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OBJECTIVES BY UNIT	CONTENT
Unit 2 Power Tools Objective 7 Identification Be able to identify with the correct name, all power tools in a given shop as evidenced by a quiz	Identification of Power Tools .Stationary power tools .Portable power tools-saws, drills, grinders, other .Gasoline power tools-pumps, chain saws, generators, etc.
Objective 8 Tool selection Be able to select the proper power tool for doing a given job	Selecting the Proper Power Tool . Functions of the various power tools . Capacities, capabilities of the various power tools . Other factors . The job, size, situation . Tools available-size, performance, types, capacities . Precision required . Selecting the proper accessories (blades, teeth, grit size, etc.)
Objective 9 Be able to operate any power tool in a safe manner as observed by the instructor to complete a list of assigned operations.	Operation . Safe operating procedures for using power tools . Factors to consider 1. operating condition of the tool (is it sharp, etc.) 2. workers clothing (goggles, gloves, safety equipment in place) 3. safe working area (proper lighting, neat work area, etc.) 4. all safety guards on the equipment . Stationary Power tools . Portable power tools . Gasoline power tools

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
A. Show tools in the shop B. Pictures in shop books C. Power tool companies catalogs and sales literature	A. Study material to identify tools B. Identify tools in the shop	A. Oral quizzes B. Quiz on shop tool identification-using the actual tools
Tool Selection A. Demonstrate tools in the shop B. Filmstrips (IMS) C. Read references . Lecture	A. Select properly equipped power tools for different "paper" jobs, ex. select the properly equipped tool to rip a 12 foot 2"x4" into two equal pieces B. Students select proper tools for jobs going on during the module	A. Grade assigned to the list of tools selected for the "paper" jobs assigned. B. Can be part of daily shop mark
Operation A. Demonstrate to small groups or whole class B. Read references C. Filmstrips (IMS) D. Movies . Read operators manual references	A. Use tools in the shop to complete different operations required by the instructor B. Use tools properly to work on individual or class projects	A. Can be part of the daily class grade B. Observation and grade by instructor on given tools on given operations C. Check list of operations safely and properly completed

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OBJECTIVES BY UNIT	CONTENT
Objective 10 Maintenance Be able to maintain the power tools found in a given shop at a level deemed satisfactory by the instructor	Principles of Maintenance . Lubrication-periodic, daily . Cleaning . Checking for defects and worn parts . Replacing worn parts, sharpening, refitting, etc. . Proper storage . Proper care of electrical components, grounding, plugs, wires, etc. . Proper mixing of fuel . Care of special attachments

TEACHING METHODS	STUDENT APPLICATION ACTIVITIES	EVALUATION PROCEDURES
Maintenance A. Demonstrations B. Read operator's manual C. References	Maintain the shop tools throughout the module	A. Quiz on maintenance principles on the different power tools covered B. Oral quiz in shop when maintenance is required a given tool C. Make a part of daily grade be based on students ability to maintain the tools he is using.

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MODULE OF INSTRUCTION

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RESOURCE MATERIALS

Books:
Teacher references
1. Portable Power Tools - Delmar
2. Hand Wookworking Tools - Delmar
3.
4.

Student references
5. The ABC's of Hand Tools - GM Corp.
6. Disston Saw, Tool and File Manual - H.K.Porter Co., Inc., Pittsburg, Pa.
7. Getting the Most out of your Drill Press - Deltacraft Publications, Pittsburg,Pa.
7a. " Radial Arm Saw - "
7b. " Abrasive tools - "
7c. " Circular Saw - "
7d. " Band Saw - "
8.
9.
10.

Bulletins:
Teacher references
11. Drill Press Work - Delmar
12. Bench Work - Delmar
13. Machine Shop Measurement - Delmar
14. Sharpening the Twist Drill Bit - Penn. (IMS)
15. Tool Sharpening Gauge - "
16. Sharpening A Plane Iron - "
17. Safety Charts for Power Tools - Ill. (IMS)
18. Chain Saw Technician Workbook - IMS
19.
20.

Student references
21. The Shop and Maintenance Center for Home and Farm - Ext. 1208
22. How To Select the Right Grinding Wheel, - Norton Co., Worcester, Mass.
23. Fasteners Caterpillar Tractor
24. Fundamentals of Service Shop Tools - John Deere
25. Craftsman - How to Sharpen
26. Power Tools
27. Wood Lathe
28. Drill Press
29. Band Saw and Jog Saw
30. Power Router
31. Radial Arm Saw
32. Drill Press - Minnesota (IMS)
33. Portable and Stationary Grinders - Minn. (IMS)
34. Hand Tools - Minn. (IMS)
35. General Shop - Minn. (IMS)

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RESOURCE MATERIALS (continued)

Audiovisuals:
36. How to Select the Right Grinding Wheel - Norton Co., Worcester, Mass.
37. Grinder Visuals - (IMS)
38. Vise Visuals - IMS
39. The Circular Saw - filmstrip - Ill. (IMS)
40. The Portable Electric Saw - Ill. (IMS)
41. The Drill Press - Ill. (IMS)
42. The Power Grinder - Ill. (IMS)